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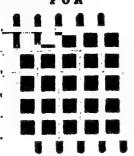
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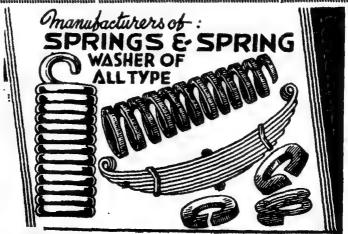
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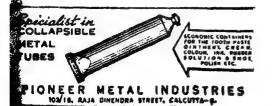
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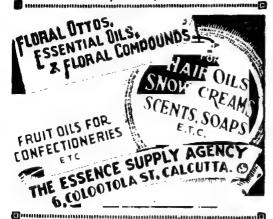
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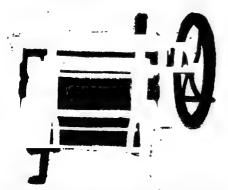
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N. BANERJEE.

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No. 493.

"SOLID RESULTS."

THE Indian Budget for 1951-52 presents an overall picture of the economic conditions which can by no means be called hopeful.

It is distressing to note that notwithstanding the plethora of plannings covering almost all spheres of economic activities and frequent exhortations to the men in the street to be practically-minded and engaged in solid work, the general economic conditions in the country do not register any improvement; on the other hand they are actually causing "considerable anxiety," as stated in the Budget speech of the Finance Minister.

If this deterioration is causing "considerable anxiety" to the Government, it is causing much more auxiety to the people who are going without food and cloth and have to deny for long years the very amenities of life which stand for higher "standard of living" for which it is stated the Government is striving for. Neither do they know when they will be relieved of the heavy taxations under which they are groaning.

Inescapable conclusion from all this is that there are some defects in working out the plans. It is time that proper enquiries be instituted about the progress of the various plans in operation for which the Government is spending lots of money. Lately an enquiry was made by the Reserve Bank of India about the progress of the Grow-more-food campaign in Bombay, which had been in operation for the last eight to nine years. The investigations revealed that "the achievements of the campaign did not appear to be commensurate with the resources expended on it," and that "the campaign was often directed with more attention to publicity and glamour than to solid results." The total failure of the Jute Campaign, as lately disclosed in a press communique, should also set us athinking if we have the right type of men at the helm of affairs who instead of merely devoting themselves to publicity work in the press will act in a way that will lead to "solid results." The recent revelations about the scheme for pre-fabricated houses, fertiliser factory, etc. should be stern eye-openers to the Government. It is time that the Government set about their business in a practical way and instead of allowing matters to drift in an aimless way give a correct lead by carefully re-examining the schemes and leave them in charge of those who are capable of showing "solid results."

-CURRENT TOPIC

WORLD TOBACCO CONGRESS

A World Tobacco Congress will be held at Amsterdam from the 17th to 24th Scotember, 1951; under the auspices of the Netherlands Ministries of Economic Affairs and of Agriculture, Fisheries and Food of the Government of the Netherlands. The Congress intends covering the entire field of cultivation, science, commerce and fabrication of tobacco, in order to co-ordinate the work of the agencies which are interested in this field.

Attached to the Congress, an exhibition will be held for the display of raw tobacco and its production, excepting tabocco manufactures. It is hoped that as many parties as possible will avail of the opportunity for displaying their products to a large gathering of world tobacco interests. Particulars may be had of the Director of Exhibitions, Ministry of Commerce and Industry, Administrative Intelligence Room, Queensway, New Delhi.

TRADE ARRANGEMENTS BETWEEN INDIA AND SPAIN

Trade arrangements have been arrived at between the Governments of India and Spain as a result of discussions held in October 1950. The arrangements will continue in force up to September 30, 1951.

The Spanish Government have agreed to grant licences for the import of freen or black tea from India up to a value of pound 4,000. The other main Indian goods of interest to Spain are: hides and skins, dyeing and tanning substances, kapok, shellac, manganese ore, chrome ore, carborundum and corindon, linseed,

Indian Government have agreed import from Spain fluorspar and lithope There are a large number of other co modities available in Spain which can imported into India under the exist import control regulation. Some of th are: potassium chloride, tartaric acid, c drugs and manufacturers. saffron, almonds, glass sheets and pla implements and tools, electric motors permissible type, electric meters, leat tanning and curing machinery, pow driven pumps, saw mills and wood wo ing machinery, olive oil, knitting machin textile machinery of permissible type cotton, fute and wool, shuttles, lead (and wrought), quick silver, cigare paper, umbrella cloth, ferro-alloys, l bearings above 1" bore diameter and ro bearings, abrasives, pneumatic air cc pressors, railway accessories, firewo for ship, electrical appliances (permissi type) and permissible chemicals.

QUALITY OF SUGAR MANUFACTURED INDIA

A remarkable feature of the produ tion of sugar in India for the season 19. 50 is that the quality of sugar manuf. tured shown a welcome improvement mu the production of I.S.S. No. 29, the his est colour grade, shows marked increfrom about 1.97 per cent in the last sson to 9.19 per cent this season. Produ tion of I. S. S. No. 28 also has been near twice that of the last year, the rise bei from 26.41 to 49.13 per cent. I. S. S. this year covers the highest product and marks a significant improvement inasmuch as I. S. S. 27 accounted for highest production during the past seasons.

Production of I. S. S. No. 26, has got

8 this year: production under other rer grades have likewise decreased. e bulk of production is represented by ee colour grades, viz., I. S. S. Nos. 29. and 27, which account for 96.05 per it of the total production. A signifiit improvement of the year is that the rease in production of I. S. S. colour ides Nos. 27, 26 and 25 has been wholly orbed by the increase in production of higher I. S. S. colour grades Nos. 28 1 29, which marks a definite progress vards production of better qualities of far in respect of colour. Production of iar in different I. S. S. grain sizes conies to be more or less similar to that of last year.

VTRAL BUILDING RESEARCH INSTITUTE

The Seventh National Laboratory of iia viz., the Central Building Research titute, started functioning last Februat Roorkee, Uttar Pradesh, The ns of research which the Central Inste will undertake include, among ers, (a) problems of heating, lighting l ventilation of building; (b) properof materials used in building such as ient, plaster, bricks, etc.: and icture and strength of materials. It will s undertake examination of buildings common use and methods of applying m with a view to effecting improvement erever practicable, undertake scientidiagnosis of the causes and defects of ures in materials themselves or in their lication, and prepare standards of mates and codes of practice for various ects of building construction.

The Institute, it is understood, will ry on its research work in collaborativith the building industry in general, activities naturally include basic rectch and fundamental studies coming him its purview, such as X-ray studies differential thermal analysis of clays

and their electro-chemical and rheological properties, strains and stresses in structures, and comfort in buildings. It will be assisted in its work by an Advisory Council, representing different interests, and by standing and ad hoc scientific and technical committees, consisting of specialists in different subjects. It is to be hoped that the Institute will also consider the problem of planning and building houses for the low income groups and the refugees.

DRUG RESEARCH INSTITUTE

The progress of research in drugs and medicines in our country has been, sporaunorganised, and haphazard. In view of this, and also prompted by the imperative need for ensuring collaborative effort among the various groups of scientists engaged in drug research, the Pharmaceutical and Drugs Committee of the Council of Scientific and Industrial Research emphasised, as early as in 1947. the importance of intensive research on drugs and chemicals forming an integral part of any comprehensive health plan for India, and recommended the establishment of a Central Research Institute. It is in pursuance of this recommendation that the Government of India decided, some time ago, to set up the Central Drug Research Institute at Lucknow as one of the eleven National Scientific Laboratories. The opening of this Institute in February by India's Prime Minister thus marks a very significant event in the history of Indian drug research.

The Institute's main functions are:—
(1) promotion of drug research generally; (2) testing and standardisation of drugs discovered there and providing expert advice on further development and production; (3) providing facilities and advice to such scientists. universities. and

institutions, industries and others as are not in position to carry out complete investigations in matters relating to drugs; (4) organising controlled clinical trials of drugs in hospitals and clinics; and (5) dissemination of scientific knowledge relating to drugs. The Institute will have several divisions, including chemistry, biochemistry, pharmacology, microbiology and parasitology, clinical science, and botany, besides an animal house for testing the effect of various drugs on animals.

The prevalance of epidemic and endemic diseases, such as malaria, small-pox, cholera, plague, typhoid and typhus fever, should set the scientific workers connected with the Institute athinking if new drugs and medicines can be made and rendered available to the common man at as cheap a price as possible. This will be helpful to the industry and serviceable humanity.

GARDEN COLONIES

Low yield of different fruit trees is an important problem of our country. The vield of most of the fruit varieties is not even 50 p.c. of that obtained in some of the advanced countries. The Agriculture Department, Punjab (1), in view of the vital importance of this problem has been collecting leading varieties of all fruits and selecting the competent ones after thorough comparative trials for producing of desired pedigree. The Department has also been supplying genuine plants to the public at prices much below those charged by private nurseries. For this purpose, a Central nursery is maintained at Jullundur with subsidiary branches at Gurdaspur, Attari, Palampur, Abohar, Hansi, Sirsa, Karnal, Panipat and important fruit growing areas of the State. The idea is to make available nursery plants of approved types at the very door of the

growers and thus minimise the cost transportation and the chances of mort. lity in transit. It is also proposed extend the work of supply of reliab nursery plants.

FRUIT INDUSTRY IN PUNJAB (1)

In order to revive the fruit industrin Punjab (1) the Government have reserved an area of 21,030 acres in 20 compact blocks in the state for the establishment of fruit orchards. Mostladisplaced persons have been allotted land in these colonies in blocks of 20 and 10 acres. This is the first experiment of its kind in co-operative gardening in the whole of Asia, with great potentialitic for the future.

INDUSTRIAL PRODUCTION

The year 1950, was a period of properity" for all major industries, excepting cotton textile and jute industries, which were handicapped by the shortage of raw materials due to trade deadlock with Pakistan. Statistics regarding the leading national industries showed that cotton textiles last year reached the lowest ebl since partition. The textile industry's output in 1950 was 3,667 million yards of cloth, a decline of 237 million yards from the previous year. The jute industry India's major dollar earner, also touched a low ebb in 1950 with the production of jute goods totalling 836,000 tons as agains 946,000 tons in 1949. Production in other major industries, e.g., steel, coal cement, salt and electrical goods registered substantial increases. Steel production increased to about 980,000 tons last year The previous year's production was 920. 000 tons. Cement production went up to 2,600,000 tons last year as against 2 100

000 tons in 1949. During 1950, 32 million tons of coal were mined an increase of 5% over the previous year. The country's entire requirements of softcoke and brick-burning coke were met from Indian collieries. Over 70,700,000 manuds of salt were produced in 1950 as against 55,600,000 manuds in 1949. India's salt production is adequate for her needs and may even leave a margin for exports, in the opinion of salt dealers.

LOCOMOTIVE MANUFACTURE IN INDIA

It may be recalled that a Technical Aid Agreement was signed about a year ago between the Indian Railway Admidistration and the Locomotive Manufacturers' Association of Great Britain. Under the agreement, any locomotive which India may require over and above her indigenous production will be supplied by the Association subject to the price and delivery being satisfactory to the Ministry of Railways. In 1950 three locomotives were built at Chittaranian with parts manufactured abroad. The 1951 target is 33 locomotives with 33% of the parts built in the Works. It will produce 45 locomotives in 1952 with 72% parts manufactured at Chittaranjan, while in 1953 the target will be 60 locomotives. 80% of the parts of which will be built in India. Complete production of 90 locomotives has been planned for 1954.

Under the Agreement technicians are also being supplied by the Association for the Works. There are now six full-time British consultants on loan. In addition, the Works is periodically visited by a chief technical consultant one of whom is now in India. The first batch of about 10 Indian technicians is now in England on training with member firms of the Association.

TISSUE MILL IN INDIA

It was felt that India being a chisource of hemp and seed flax, which a the main raw materials, for the manufacture ture of tissue paper for cigarette makir should be an ideal home for its manufact ture but the supplies of tissue from abroa being adequate, no project for its prodution was then conceived. It was no until the late war that supplies from man parts of the world ceased and the prov sion of tissue paper for the cigarett industry in this country became in a senses of the word a burning question In 1942 cigarette manufacturers decide to ensure their source of supply by mant facturing in this country. A small pik installation, which cost only Rs. 10,00,00 was set up a Ranigani. It was capab of producing from 30 to 40 tons of tisst paper a month, and came into productic in 1943. It was the success of this plan that decided the promoters to go ahea with the far larger project of making tisst paper on a commercial scale at Triber The Mill has been designed to produce 24 tons of finished tissue a month. This a small amount in terms of normal paper manufacture, but it is of considerab importance in terms of cigarettes. Th output each month on this basis is suff cient to wrap five and a half thousan million cigarettes. That is, 250,000 mile of cigarettes placed end to end or 5.00 miles of cigarettes packed in tins of 50 Less than half this quantity will at th present moment be required for cigarett production in India. One hundred an forty tons per month will be available for export to West Africa, Israel, Sout America, Central America, China, Autralia and New Zealand. The foreig currency accruing to India as a result (these exports will amount to approxima tolar De 1 00 000 nee treat

PIXATION OF MINIMUM WAGES

The question of fixation of minimum wages for industrial labour as envisaged in the Central Minimum Wages Act of 1948 was referred to the National Plann-Ina Commission. The Commission thinks that the time is not opportune for such a step, especially because of unsettled conditions in most Indian industries resulting mainly from international developments. It is thought that the fixation of minimum wages will invariably lead to increased production costs, and will adversely affect the country's economy in addition to worsening the competitive position of Indian industries in the world market. Considering the Indian Government's Inancial and administrative limitations. the Commission has also suggested that he statutory fixation of minimum wages for agricultural labour be left to the discretion of States.

Accepting the Commission's suggestions, the Government has decided to amend the Act during the current session of Parliament. The Amending Bill will seek to extent the time limit for fixing the ninimum ages for industrial labour by another year from March, 1951. The original time limit was March, 1950.

LTOMIC ENERGY MINERALS

Geological Survey by Atomic Energy Commission has revealed rich and extentive deposits of Atomic Energy Minerals in parts of Travancore, Madras, Bihar, Rajasthan, and Ajmer. Two Uranium selts also rich in Thorium and Lithium have been discovered, one, 50 miles long in East India and another running toward: North West from about Central India.

Of the universally recognized Atomic Energy metals. Uranium, Thorium and Beryllium, India is richest in Thorium deposits. A Factory at Alwaye, in Travancore, is to be set up for separation of Uranium and Thorium from Monazite sands. The Union Government and the Travancore State Government are jointly setting up a Factory for processing Monazite sands for the production of rare carths. Uranium etc.. A French firm is setting up the plant offering the necessary technical assistance and undertaking processing until such time as the Indian personnel being trained by the firm, in France, are in a position to assume charge of processing. Another Factory is to be set up for production of Uranium and Thorium Compounds from out of the Uranium ores as also Uranium and Thorium bearing residues obtained from the Rare Earth Factory at Alwaye. This factory is expected to be self-supporting by sale of Thorium compounds indigenous Gas-Mantle Industry.

Atomic Energy Commission has offered to buy all stocks of Uranium ore at prices based on their Uranium contents. As a further incentive rewards are offered for discovery of new deposits and grants-in-aid for mine developments.

Lithium bearing mineral deposits have also been recently discovered. The metal is found to be very important in the production of Super-bombs. India is one of the few countries possessing large quantities of this rare metal.

-INDIAN SOIL & CROPS

THE enormous extent of the territory of India and its vast population are now causing the State a good deal of difficulties to feed the people. Since the chief wealth of an agricultural country extensive methods of cultivation is the soil, from the crop of which live both the peasant and the State itself.

The soil of India is intrinsically rich. and suited to the particular crops sown thereon. The land of the country has been under the plough for countless centuries but has shown no signs of exhaustion. It still continues to yield fairly large quantities of the crops shown thereon. The yield per unit is comparatively lower in this country than in some more advanced and scientifically better developed countries. employing technique and providing appropriate aids to keep the soil perennially rich. But that is due rather to ignorance and economic factors, than to any inherent defects of the soil.

AREA CULTIVATED UNDER VARIOUS CROPS

The gross area cultivated with crops covered 253,198,000 (India proper) plus 77,309,000 (in Indian States) acres in 1942-43. The different classes of crops and the area occupied by each class are stated in the table below. Of the total sown area food crops occupied about 267,708,000 acres or 82 per cent and money crops 44,796,000 acres plus 1°,003. per cent. Of the foodcrops, food-grains (cereals and pulses) covered as much as 197,923,000 plus 56-156,000 acres or 78 per cent of the total area sown and other food crops (condiments and spices, sugar, fruits and vegeand miscellaneous food-crops together) some 10,479,000 plus 3,150,000 acres or 4 per cent of the total. Of the money crops, fibres (such as cotton jute, hemp, etc.) occupied 15,994,000 plus 6118 acres and oil-seeds 15,110,000 plus 7817 acres, or 6 per cent of the total area sown in each case. The other non-food crops—dyes and tanning materials, drugs and narcotics (tobacco, tea, coffee, opium, etc.), fodder crops, and miscellaneous non-food crops together occupied about 13,692,000 acres or 6 per cent of the total. This will be evident from following table:—

	Area In India	Area in
	Proper	States
	(Thousand	Acres.)
Food grains	197,923	56,15 6
Condiments and Spices	1,430	982
Sugar	3,588	301
Fruits & Vegetables	4.126	1,223
Miscellaneous Food Crops	1,335	644
Total Food Crops .	208,402	59,306
Oil-seeds	15.110	7,817
Fibres	15,994	6.118
Dyes & Tanning Materials	80	4
Drugs and Narcotics	2,114	536
Fodder Crops .	10,607	2,511
Miscellaneous non-Food	,	_,,,
Crops	891	1,017
Total Non-Food Crops	44,796	18,003

In the development of agriculture, however, the first and foremost consideration is the study soil, to find out its suitability of cultivation of a particular type of crop. Then classify the soil according to this system. Of course, one type of soil may be conserved with other type by judicious application of manure.

In this article it is proposed to discuss the different varieties of Indian soils, their capacity of food production and their development to meet the ever-increasing

SOILS AND ITS FORMATION

Soil may be defined as a heterogeneous collection of rock and mineral fragments whose decomposition and disintegration have been brought about by the action of physical, chemical and biological forces, working singly or in combination. From the view point of the agriculturist, the main function of the soil is the support of plant growth, hence the above definition must include that a soil must contain sufficient decomposeable plant remains to serve as a source of energy in stimulating the action of these forces to produce plant food in an amount sufficient to support the growth of plants commonly used in agricultural pursuits.

As our present soils are a result of actions that have continued throughout all the ages, it is evident that they would differ markedly in their characteristics. The kind of rock, or rocks, from which they have been formed, and the time, manner, and place of their formation together with certain features that they now possess, present definite factors that can be correlated, and thus serve as a basis for a definite classification.

PHYSICAL CLASSIFICATION OF SOIL

The soils may be classified into sedentary and transported. Transported soils are again subdivided into Alluvial and Diluvial. Alluvial soil consists of fragments or particles of minerals arranged according to their size and are very fertile. Diluvial soil consists of soil proper mixed up with stones and boulders, brought down by rain from hills.

Soils are also classed as Light and Heavy, Warm and Cold, Moist and Dry. They are also classified according to the crops which do best on them, or which ought to be grown on them for economical reasons. Richest soils are called garden

to their prevailing physical constitu These are, stone, gravel, grit, sand, calcium carbonate, vegetable matter moisture. Soils are thus divided stony, gravelly, gritty, sandy, cli calcareous, peaty and marshy. The however no hard and fast distinction ween one group and the next. Sand be against siliceous, or micaceous felspathic, that is either containing a of plant-food or none at all. Stones pebbles are not immediately useful plant-life but they serve a useful pur in retaining moisture and acting a reserve of plant-food. Stony soils th fore though usually poor are not necessarily, and some stony soils. those which contain chiefly fossils, I stones, basaltic stones and felspars, rich.

MECHANICAL ANALYSIS

The mechanical analysis of soil done by sifting and washing. Sil separates the coarser particles and w ing the finer particles. The sample of to be analysed is to be spread on the: of a dry and warm room; lumps are I broken up and crushed as drying proce The large stones are then to be pic out. cleaned, dried and weighed. dry soil is then to be passed throug sieve the meshes of which are 3 mm diameter. That which passes throug weighed as fine earth, and what rem on the sieve as gravel. The grave further washed and dried and weig again as true gravel. The fine eartl then boiled for an hour to break lumps, and it is then put into a wash apparatus (e.g., Schulz's apparatus, which by introducing a flow of wate: different rates, first the finest suspen matter is washed away and then succe

Another process of mechanical analyof soils consists in arranging a series ressels side by side and allowing the er from the one to flow into the next. also divides the soil into portions of rent consistency. For either process necessary finally to let the water porate completely from each vessel and reight the dry residue. This analysis ples us to separate the soil into (1) es; (2) mechanical gravel; (3) coarse l; (4) fine sand; (5) finest sand, and clay and impalpable matter. Clayproper is that which contains only and impalpable matter. Soils which the physical property of clay may ain no clay in the chemical sense. i.e.. eath of aluminium. The composition hemically pure clay may be represenby the formula A1202Si02H20.

A more rough and ready method of hanical analysis consists in taking an ze of soil, mixing it up with a pint of zr, leaving it in the water for 24 hours, shaking it up and allowing the heavisarticles to settle for 5 minutes. The rnatant liquid can then be poured innother vessel which may be allowed and for another 24 hours. The sandy will be seen settled in one vessel and clayey part in the other. These may lried and weighed separately.

If 100 grains of dry soil, not peaty or sually rich in vegetable matter, leave more than 10 of clay treated in this ner. it is called sandy soil; if from 10 0 sandy loam; if from 40 to 70 a loamy If from 70 to 85, a clay loam; from o 95, a strong clay soil; and when no l is separated at all by this process, a pure agricultural clay. Pure clay ains silica and alumina in the proporof about 60 of the former to 40 of the r, but the composition of agricultural

however, that arable land should contain more than 30 to 35 per cent. of alumina. Soil containing more than 5% of carbonate of lime is called marl, and more than 20%, calcareous soil. Peaty soils contain more than 5% of humus or vegetable mould. Ferruginous soils contain over 5% of iron.

CHEMICAL CLASSIFICATION

In chemically classifying the soil we must consider the chemical composition of plants and then classify according to chemical requirements of plants. We know that plants derive the bulk of their food from the air and from water. The largest proportion of a plant consists either of carbon or of water. The carbon portion of a plant also varies very much,. but it usually comes next in importance to water. The carbon is fixed in plants with the help of sun light acting on chlorophyll granules, out of the carbon dioxide of the air. So the carbon of plants is derived without any trouble on the part of the cultivator. The nitrogen of plants is partly derived from the atmosphere by rain but it is mainly obtained from the soil and manures applied to it. • The presence of ammonia and nitrates in the soil is therefore of great importance. In fact, the amount of nitrogen present in the soil mainly determines its value. There are other constituents of plants, are essential, though usually which occuring in minute proportions. For these minor essentials plants have to depend entirely on soil.

On burning a plant, its carbon, water, and nitrogen pass away and only ash is left behind, which on analysis is found to contain the following:—Phosphoric acid, sulphuric acid, potash, lime, magnesia and iron in the form of oxides. Soda, silica and chloring are also possible analysis always

 these food constituents. Alumina is only sometimes found.

According to the chemical requirements of plants, soils can be divided into: (1) Aqueous or boggy soils: (2) Nitrogenous soils; (3) Phosphatic soils; (4) Potassic soils: (5) Calcareous soils: (6) Perruginous soils; (7) Siliceous soils; (8) Alkali soils (containing an abundance of Ca0, Mg0, Na0 and K20); and (9) then sulphurous soils. Water is of the highest value, then nitrogen, then phosphorus, then potash, then lime, then sulphur, then iron and lastly silica, chlorine and soda. The physical importance of Silica or Sand, as making the soil freer and lighter to work and for roots to penetrate, is very great, but not its chemical importance. The chemical importance of the soluble silicates in soils is, however, very great. The importance of Chlorine and Soda (i.e., of common salt) for certain crops such as coconut, mangoes, beet (not sugarbeet), onions, carrots, radishes, potatoes, cabbages, cotton, cashew-nuts, date, breadfruit tree, asparagus, is undoubted, but the presence of these is not · essential in the soil for every crop.

Potassium salts can replace sodium salts in some plants, and the presence of potassium salt is therefore doubly important. The absence of any of the essential constituents of plants, as mentioned above, makes a soil quite sterile. But in rare cases it is met with a type of soil wanting altogether in moisture, or nitrogen, or phosphoric acid, or potash, or lime, or magnesia, or iron, or sulphuric acid.

Plants generally grow in any soil which contains a sufficient proportion of these. The presence of an excess of certain salts or of some substances poisonous to plants may render the soil sterile in spite of the

contains all the essential constituents the growth of vegetation, and even well-water or drainage-water percola through soils contains all the esse constituents for the growth of vegeta so much so, that water-culture with . well or drainage-water alone has l successful with reference to a good n plants including oats. It is from solut that plants can absorb food. The sol lity is helped by the organic acids and carbon-dioxide excreted by the root Soil digested in water ought to part 1 part of solid for every 1,000 part water for plants to make proper use of solid. If over 2 parts of solid are diss ed in 1,000 parts of water, the roo cannot make proper use of the food, no less than .5 part in 1,000 parts. A can be too rich in soluble plant-food too poor, as the solubility is required to in a certain dilution. A soil becomes too if in the dry season it is manured with f urine which contains nearly 2 p.c. of u a substance which can be directly used plants as food. But a 2 per cent. solu even of a valuable plant-food is at I 10 times too rich. This accounts Bengal cultivators regarding urine as jurious to crops, though it is really n valuable in the fresh state than cowdt Diluted with ten times as much w urine proves a most excellent fertilize soils. As nearly all soils contain all co tituents of plant-food. classification of soils is based not absolute but only on relative grounds

TYPES OF INDIAN SOIL

There are four main varieties of s in India, namely:—

(a) The red soils derived from re of the Archaan system. These are for chiefly in Madras, Mysore and the Sou to Orissa, Chota Nagpur, and the h of Bengal.

- (b) The black cotton or Regur soils ch overlie the Deccan trap and cover greater part of Bombay, Berar, the estern parts of Madhya Pradesh Hyderabad with extension into Cen-India and Bundelkhand. In Madras se soils are less common but still portant.
- (c) The alluvial soil of Indo-Gange-Plain and the Plains of the Indus alley. They are the most important a variety from the point of view of ricultural productivity yielding probabthe largest quantity of food stuffs. hese include Sind, Northern Rajasthan, injab, Utter Pradesh, Bihar and half of isam.
- (d) The laterite soils forming a belt und the peninsular and extending into 1st Pakistan, Assam and thence to 1rma.

Besides these four main categories, ere are other soils in India, such as the sert soils of Rajasthan or Eastern parts West Pakisthan, which are not so rich yield or extensive in area. Rajasthan d Southern Punjab have other varieties alkali soils, which go under various mes in the different Provinces. These ils have a high degree of impermeability d stickiness together with heavy alkality and frequent presence of excess of the salts. These soils are usually poor nitrogen and so are unsuitable for crop Ising without previous reclamation.

Forest soils make yet another category, d occupy large tracks of the country. ie soil profiles in Chaubatta Hill and of Kulu Forests belong to the Brown irth anid Bordsol variety.

DIFFERENT SPECIES OF CROPS

After classifying the soils both ysically and chemically let us classify

the soils with reference to the crops. This kind of classifiateion has the merit of being easily applicable in practice to ordinary farming, as it does not depend on elaborate chemical analysis but only on such rough and ready methods of analysis as an intelligent and educated farmer can easily command.

To determine the class of any soil the following direction should be followed:—

- (1) Take 100 grains of a well-pulverized soil after drying it for half an hour in an air or oil-bath at 250°F. Heat it in a platinum crucible for half an hour. stirring the mass occasionally. Cool it in a dessicator and weigh. The loss of weight is calculated as Humus.
- (2) Digest the residue in the platinum crucible in a phial with cold diluted Hydrochloric acid in proportion of a ounce of acid to 10 ounces of water to 100 grains of dry soil. Let the digesting go on for half an hour with occasional stirring. Filter through a weighed filter-paper, wash until the water passing through ceases to give acid reaction tested with litmus paper. Dry the whole at 250°F.; weigh the substance in the filter paper; deduct the weight of the filter-paper. The loss of weight represents the amount of lime.
- (3) The contents of the filter paper are now carefully removed into a tall glass cylinder, and the impalpable matter is separated from the sand and coarser particles by repeated washing with water. Stir well, let it subside for a minute and then pour on the supernatant liquid. The impalpable matter thus separated is collected on a filter, dried as before and weighed. The weight represents the weight of clay.
 - (4) The remainder is sand.

From the above method of classifica-

crops, which will grow on a particular soil.

ARGILLACEOUS OR CLAYEY SOILS

Argillaceous or clayey soils, which contain above 50 per cent clay and do not contain more than 5 per cent lime commonly called paddy land are suitable for the cultivation of sugar cane, paddy, wheat, arahar, gram, peas, beans, moong, linseed, and cabbages. The calcareous kinds of soils which are not too rich in clay and not too poor in sand and humus, give good returns. And those, which are poor in humus, are still suited for oats.

LOAMY SOILS

These soils contain not more than 50 not less than 30 per cent of clay and do not contain more than 5 per cent of lime. These are known as vegetable land. The most appropriate types of crops grow in this class of land are wheat, barley, grain, lower, cotton, arahar, maize, beans, cauliflowers.

SANDY LOAMS

These kind of soils contain not more than 30 per cent not less than 20 per cent of clay. They do not contain more than 5 per cent of lime. These soils are suitable for the cultivation of bajra, kalai, aus paddy, barley with gram, jowar, mustard with wheat, and other rabi crops, potatoes and turnips. Other root crops also thrive well in these soils.

LOAMY SANDS

Loamy sands contain not more than 20 not less than 10 per cent of clay and contain less than 5 per cent of lime. These are suitable for growing kalai, mustard, sorguja, cucurbitaceous vegetables (melon, gourd, etc.), barley if rich in humus, and jowar.

SANDY SOILS

In sandy soils not more than 10 p.c. of clay is present. They do not contain more

than 5 per cent of lime. These are camillet land and are best suited for c vating the following: Bajra with sorguja, kaial or moong, also barley value and often cultivated only exthird year and the poor lands are crivated at all. Those soils contain humus and lime are chiefly fit for bu wheat, oats, hemp, tobacco, potate millets and maize.

MARLY SOILS

Marly soils contain more than 5 | cent but less than 20 per cent of lir The argillaceous types containing abo 50 per cent clay, and 5 to 20 per o lime are commonly called paddy a arahar lands. They are suited for pade arahar, wheat, khasari, and moosur. T loamy types are containing 30 to 50 t clay and 5 to 20 p.c. lime suitable wheat, potatoes, barley, and pulses. T sandy types are best suited to barley. or gram and maize. The types of ma soils belonging to loamy sand are suit for oats, jowar, pulses and bajra. T marly soils which contain above 5 1 cent humus. 20 to 50 or more of clay a 5 to 20 p.c. of lime, are suitable for cor: The humus and argillaceous marly sc are amongst the best that exist.

CALCAREOUS SOILS

The calcareous soils contain me than 20 per cent of lime and are know to cultivators as pulse lands. The arg laceous soils often approach in value the argillaceous marls; the remaini orders of both these classes equally corespond one with the other; to the me valuable belongs, as in the case of mar soils, the humus. Those wanting in him mus require much manure. Those rich clay are well suited for wheat. Oats as lucerne thrive in them. Their value much decreased by containing an exce

of lime. It makes soils both hungry and thirsty, i.e., they need heavy manuring and irrigation, unless there is humus in them, over 5 per cent. But oats and most pulses and lucerne will do on such soils.

HUMUS SOILS

Humus soils are known as lands for oil seeds and vegetable. The value of these soils is greatly augmented by admixture with lime. Those which contain lime and clay are suited for wheat, barley, melons, gourd, and oleagenous plants; the loamy and sandy humus soils are specially adapted for oats, and in most places for wheat. The peaty and acid humus may be made fruitful by admixture with lime, sand and clay.

. EFFECTS OF SUNLIGHT, RAIN, ETC

Effects of different coloured rays of the sun on vegetation are important factors bearing on farming. A short discussion on this subject will give an idea to the would be farmers.

Solar rays are composed of seven colours. The different colours are known to produce different effects on vegetation. The following extract from Mr. N. G. Mukherjee's Handbook of Agriculture will show the effects of different colours such as ruby, brown-red, orange, vellow, cobalt-blue and deep green. "The young plants first broke the soil in the box covered with the orange glass, and last under those covered by yellow, green and blue glasses. It was subsequently found that the effect of the yellow rays was such as to prevent the germination of the seed, even although the rays only rested on the surface of the soil while the seed lay buried beneath; while, again, the blue light seemed to remarkably favour the process. Under the orange light the plants grew vary tall, but then they had white stalks, and they refused to put forth any flowers. Under the yellow light it was remarkable

that a numbier of little fungi or mou sprang up and flourished luxuriar while the plants themselves withered a died. Under the red light the plants o grew an inch or two high, had someth of a reddish colour, and soon rotted a perished, although supplied with abus ance of food in the soil in which th were placed. Under the green light plants grew slowly but tolerably strovet none would flower, notwithstand: the greatest care and attention paid them. The results under the blue gla were very different. The seed germin ed a little less quickly than in the or air, but the plants became compact a healthy in their character, putting for their flower-buds strongly and floweri in perfection. Under this light alone the various processes go on with the vigour which is characteristic of vegetati in the open air. It is inferred that su would also probably be the case w plants grown under violet glass."

RAIN-FALL

The amount and distribution of rai fall which a particular locality receive usually determine its productiveness, a pecially in the tropics. In the Malab coast of India and in parts of Assam t largest quantity of rainfall occurs, as these are the most productive tracts India. The regions of heavy rainfall, i. of 70 to 100 inches or more, are Assamparts of Eastern Bengal, the Cis-Himal yan region of Northern Bengal and the Eastern and Western Ghats.

The effect of rain fall slowly but sure in changing the physical character of the surface soil, where such soil lies bare is overgrown only by short grass, must not be ignored. The finer lighter, which is advantage only for soils which are to stiff. High winds, however, bring barsome amount of fine dust and tend to ket

entre a juli

up a balance. High winds which prevail on the seaside districts are therefore not to be regarded as absolutely inimical to agricultural pursuits. In course of time they help to make sandy tracts loamy and fit for cultivation. On the whole, however, boisterous winds are not helpful to the proper growth of crops unless they are very short crops. An occasional gale may lay low and spoil a crop nearly ready for the sickle and where high winds are the rule, very few crops can be grown and the landscape is generally found quite bare of trees in such localities, and how helpful trees are to agriculture in various ways, we will see later on.

What proportion of rain evaporates, what proportion sinks into the soil and feeds wells and springs, and what proportion finds its way by means of drains, streams and rivers, into the sea, depend upon the climate of the place, the season of the year, the porosity of the soil, the nature of the strata below, and the contour of the whole district or locality.

The rainfall of India is becoming more and more capricious, and this is to be attributed to the establishment of factories in regions where there is no coal, and where, in consequence, trees are getting cut down in millions every year. There are about 1,200 factories in the Bombay Presidency, using daily about 200 manuds of fuel each. What an enormous destruction of trees this must imply. The effect of trees in equalising temperature and the distribution of rain, and in entrapping rain, is universally recognised. A law should be passed in this country insisting on the planting and maintenance of a tree for every one cut down, whether in forests or in cultivated areas.

Untimely rainfall may sometimes occur. Such heavy rainfall could be at

and Western India, and in those parts where little rain is obtained. January rains should be always utilized in getting lands under the plough after rice harvest. Once brought under the plough, the land can be afterwards kept stirred from time to time until the next rice sowing or transplanting season. This results in the soil absorbing fertility from the air and in being free from insect and fungus pests. If rains occur again in February after land has been prepared, sowing of catch-crops. or crops which take only about three month's getting ready, should proceed vigorously. Such crops as have a beneficial effect on the future rice crop should be chosen in preference: so that if the crops come ultimately to nothing, the land at least may be fertilized. Melons and other cucurbitaceous crops, maize, juar, til, bajra, marua, buckwheat, cotton, cowpea, ground-nut, dhaincha, sunn-hemp, jowar sim or arharia sim (Cyamopsis psoralioides) can be grown as catch-crops with untimely but heavy rain. The last five crops should be preferred as they have an excellent action in fertilizing the soil. When untimely but heavy rains occur in any month usually there is heavy rain again the month after, at least that is our experience in Lower Bengal; so that there should be no hesitation on the part of cultivators to utilize heavy rains whenever they may happen. It is also our experience in Bengal, that heavy rains early in the season are compensated by short rainfall late in the season, and short rainfall early in the season is compensated by heavy rainfall late in the season. Cultivators make a great mistake to consult almanacs and Brahmin soothsavers in cultivating land and sowing seed. They ought to follow their own experience and common sense in the matter.

PERTILITY OF SOIL

soil is the first codition of any permanent system of agriculture. In the ordinary processes of crop production fertility is steadily lost: its continuous restoration by means of manuring and soil management is therefore imperative.

Fertility is covered by the minimum of necessary ingredient. A soil may be rich in all essential ash constituents of plants but difficient or wanting only in one, and this deficiency or want may result in its barrenness. Soils derived from several rocks are better than soils from one rock, as there is no likelihood for such soils being deficient in any necessary constituent.

A fertile soil should contain all the essential ash-constituents of plants in a sufficient quantity and in an available form. But these cannot be readily ascertained.

A ten-plot or five-plot experiment is a practical guide for ascertaining their presence. A still readier method of judging the fertility of soil is the ascertaining of the following facts: 1st. Do earthworms and grubs of insects abound to a sufficient depth in the soil? 2nd. Do plants of various natural orders, including the leguminose, grow abundantly and luxuriantly on the soil? 3rd. Are the bones of animals habitually living on the soil. large-sized? 4th. Do shells of snails. etc.. abound in the soil? A soil which is helpful to the growth of wild vegetation and which is able to support wild animallife in abundance and build the solid parts of their body which are rich in phosphoric acid and lime. must be rich soil. The greater the absorbent co-efficient of a soil, the greater is its fertility; and the large the proportion of the decomposable silicates present in them, the more fertile they are

The greater the proportion of a soil which is dissolved by dilute acids, the more fertile it is. The amount of soilsubstances soluble in water usually varies from .2 to .5 per cent. But solubility in pure water is not a guide to the solubility of plant-food actually undergoing in the soil. Some chemists, e.g., Hermann von Liebig, assumed that dilute Acetic acid dissolved all those substances available to plants: but the acid secretions from rootlets are of a complex nature, and no absolute guide as to the dilution to be used is possible. Professor Stutzer of Bonn was the first to use 1 per cent solution of Citric acid for ascertaining the amount of available phosphoric acid in manures, and Dr. Dyer of London has carried out this method in dealing with soils, and arrived at very important practical results, in determining the proportions of available phosphoric acid and potash in soils. But the method gives no clue to the amount of available nitrogen in soils: and after all the question of fertility is mainly concerned with the amount of available nitrogen present in the soil. Besides, acid secretions from all rootlets are not all equivalent to a 1 per cent solution of Citric acid. Some secretions are more acid than others, and some plants therefore, are better able to utilize the latent fertility of soils than other. The average acidity of root-secretions in terms of Citric acid, shown by hundreds plants examined by Dr. Dyer, is not 1 but about 0.86 per cent. Coming to individual plants he found the variation was very great. Strawberry showed about 2 per cent and a geum (another plant of the order Rosaceae) as much as 5.53 per cent: while the examination of Solanaceae and Liliaceae gave very low results, about 0.36 per cent. Cruciferae and leguminose averaged about 1% while Graminese, Umbelliferae, Compositae and Chenopodiaceae showed only about 1%. These sesults, however, are very important in showing how some orders of plants, such as Rasaceae, Cruciferae and Leguminosae thrive on poor soils, while others such as Solaneae, Liliaceae, Gramineae, Umbelliferae, Compositae and Chenopodiaceae, need liberal manuring. Some plants of the same natural orders differed widely from others in this property of acidity of root-secretions and the figures should be judged according to this reservation.

BARRENNESS OF SOILS

Barrenness of soils may be produced by the presence of excess of ferrous salts formed by the oxidation of iron pyrites in the soils. Lands newly reclaimed from the sea contains ferrous salts and therefore temporarily barren. Soils mix with tank-earth are barren for the time being. Ferrous sulphate is soluble in water but ferrous salts combined with organic matter are soluble in hydrochloric acid. Soils which are too acid may therefore become harren when there are orgame ferrous salts present. Drainage, lining and cultivation and exposure to the action of sun and air are the means of reclaiming lands containing these poisons.

More than 2 per cent of soluble salts in a soil makes it barren; but a very much less proportion of sodium chloride (common salt) would make a soil barren. Lands to be reclaimed from these saline soils have to be drained of their excess of salt before they become fit for cultivation. The barren lands of the West Pakistan and Uttar Pradesh usually contain an excess of sodium carbonate or sodium sulphate which are locally called Reh. These lands art being reclaimed by drainage, enclosure and light manuring. Once a series of experiments were conducted to ascertain the proportions of different radition rates which might be now.

sent in a soil without preventing plant growth. In the Handbook of Agricultur by N. G. Mukherjee it is mentioned tha to good garden soil, which was see to contain no appreciable amount of an of the sodium salts, were added definit amounts of the three salts, sodium carbo nate, sodium sulphate and sodium chloride The amounts of salts varied from .1 to 1% Cereals and pulses were sown in separat pots. It was found that each of thes salts retarted the germination. The cere als were affected by 7% of carbonate o sulphate and by .4% of chloride. Th germination of the pulses was retarded by smaller amounts, i.e., by .2 to .4% of Car bonate or Chloride and .7% of Sulphate In the after-growth .2% of the carbonat did harm, whilst .4% was quite fatal. U1 to .2% of Sodium Chloride was found harmless in a few cases, whilst .1% proved harmful in others. Sodium sul phate was less harmful, perfect growtl both in the kharif and rabi seasons being maintained in the presence of .5% of the salt. As in germination so in the after growth, the leguminose were affected more than the cereals by the excess o soda salts. From this experiment it may be inferred how the lands reclaimed in Sunderbuns though they become fit fo growing rice very readily, are found un suitable for pulse-crops for a long time In the presence of lime, however, some leguminous crops such as lucerne dhaincha can stand more common sal than they otherwise do, and in seaside places where there is no doubt of the presence of limestones, lucerne adhaincha can be readily grown.

Another cause of the barrenness of user lands is their impermeability to water Gypsum has been used with success is correcting this.

Waters from mines containing also

ten prove poisonous to plants, also raters containing copper, lead and other eavy metals, in solution.

IMPROVEMENT OF SOILS

In its natural condition the soil is ossessed of certain existing and obvious ualities, and of certain other dormant apabilities. How are the existing qualities to be improved and the dormant apabilities to be awakened.

It follows from the above that soils may be arranged into two broad classes, namely:

- (1) Those which contain in themselves an abundant supply of all these things which plants require, and are therefore fitted chemically to grow any crop.
- (2) Those which are deficient in some of those elements on which plants live, and are therefore not fitted to grow any one crop with luxuriance.

Both these two classes of soils are susceptible to improvement the former by mechanical methods chiefly, the latter by mechanical partly, but chiefly by chemical methods of improving the soils the first step to be taken is to drain the improvable lands. The advantages that result from draining are manifold. The presence of too much water in the soil keeps it constantly cold, and thus the plants never experience for their growth that genial warmth from sun's rays, which is expended in evaporating the water. Where too much water is present in the soil, also that portion of the food of the plant which the soil supplies is so much diluted. that either a much greater quantity of fluid must be taken in by the roots or the plants will be scantily nourished. consequence the stem and leaves keep down their temperature and so the chemical changes, on which its growth depends.

By the removal of the water, the Ver. XLII. No. 491.

physical properties of the soil are in a remarkable degree improved. The soil becomes open, friable, and mellow more easily worked, and pervious to the air in every direction. The access of this air is essential to the fertility of the soil, and to the healthy growth of most of our cultivated crops. The insertion of drains not only makes room for the air to enter by removing the water, but actually compels the air to penetrate into the under parts of the soil, and renews it at every successive fall of rain.

Vegetable matter becomes of double value in a soil thus dried and filled with atmospheric air. When drenched with water, this vegetable matter either decomposes very slowly, or produces acid compounds more or less unwholesome to the plant, and even exerts injurious chemical reactions upon the earthy and saline constituents of the soil. In the presence of air, on the contrary, this vegetable matter decomposes rapidly, produces carbonic acid in large quantity, as well as other compounds on which the plant can live, and even renders the inorganic constituents of the soil more fitted to enter the roots, and thus to supply more rapidly what the several parts of the plant require. Hence, on dry land, manures containing organic matter (farmyard manure, etc.) go further, or are more profitable to the farmer. Draining also exerts a very important influence on the changes going on in the soil, whereby the nitrogen is prepared for the plant's use. In a waterlogged soil not only is the process of nitrification checked, but a reverse process goes on, whereby the nitrates already present are deoxidised and a portion of the nitrogen is set free, and escapes in the form of gas.

Nor is it only stiff and clayey soils to which draining can with

advantage be applied. It will be obvious to every one, that when springs rise to the surface in sandy soils, a drain must be made to carry off the water; it will also readily occur, that where a sandy soil rests upon a hard or clayey bottom, drains may likewise be necessary; but it not unfrequently supposed, that where the subsoil is sand or gravel, thorough draining can seldom be required.

It is not less common, even in rich and fertile districts, to see crops of beans, or oats, or barley, come up strong and healthy, and shoot up even to the time of flowering, and then begin to drop and wither, till at last they more or less completely die away. So it is rare in many places to see a second year's clover crop come up strong and healthy. These facts indicate, in general, the presence of noxious matters in the subsoil, which are reached by the roots at an advanced stage of their growth, but into which they cannot penetrate without injury to the plant. The drain calls in the aid of the rains of heaven to wash away these noxious substances from the soil, and of the air to change their nature; and this is the most likely, as well as the cheapest, means by which these evils can be prevented.

The economical advantages of draining in such soils as we posses are chiefly these?—

- (1) Stiff soils are more easily and more cheaply worked.
- (2) Lime and manures have more effect, and go further.
- (3) Seed-time and harvest are earlier and more sure.
- (4) Larger-crops are reaped, and of better quality.
- (5) Nutritive grasses spring up whise inferior grasses formerly grew.

- (6) Valuable crops of wheat and turnips are made to grow where scanty crops of oats were formerly the chief return.
- (7) Naked fallows are rendered less necessary, and more profitable rotations can be introduced.
- (8) The climate is improved, and rendered not only more suited to the growth of crops, but more favourable to the health of man and other animals.
- (9) The soil is actually enriched by what the rains bring down.
- (10) Air is sucked down into the subsoil.
- (11) Certain processes whereby plant food is being prepared in the soil are promoted, such as nitrification.

After the land has been laid dry by drains, other mechanical modes of improvement can be employed with advantage. Even the ordinary methods of mechanical culture become more useful, and the benefits which in favourable circumstances are derived from turning up the soil are greater and more manifest. This is effected in a variety of ways. For one thing, by opening up a soil the action of the frost is rendered more powerful, and the disintegration of the soil goes on more rapidly. The soil is thus rendered more porous, and the roots of the plant are permitted to develop more quickly under such conditions. We have already pointed out that the soil can absorb from the air the minute quantities of ammonia present in it. The more the soil is tilled, the more freely will its particles be brought into contact with the air, and the more abundant will the absorption of the ammonia become. These facts will appear by a brief consideration of the effects produced by ploughing to various depths, and the causes from which they arise.

The subsoil-plough is an auxiliary to te drain-it stirs and opens the under soil ithout mixing it with the upper or imrediately active soil. Though there are w subsoils through which the water will of at length make its way, yet there are ome so stiff, either naturally or from long onsolidation, that the good effect of a 'ell-arranged line of drains is lessened y the slowness with which they allow the sperfluous water to pass through them. 1 such cases, the use of the subsoil-plogh is most advantageous in loosening re under layers of soil, and in allowing te water to find a ready escape downands to either side, until it reaches the :ains.

After the land is provided with drains e subsoil being very retentive, the subil-plough is used to open it up-to let it the water and let in the air. If this not done, the stiff under-clay will conact and bake as it dries, but it will ither sufficiently admit the air, nor open free a passage for the roots. Let this peration, however, be performed when e clay is still too wet, a good effect will llow in the first instance: but after a hile the cut clay will again cohere, and e farmer will pronounce subsoiling to ra useless expense on his land. Defer e use of the subsoil-plough till the clay dry, it will then tear and break instead cutting it, and its openness will remain. nce give the air free access, and, after time, it so modifies the drained clay that no longer has an equal tendency to here.

DEEP PLOUGHING

Deep ploughing, like subsoiling, aids a effect of the drains, and so far where goes nearly as deep—even more cometely effects the same object. Deep oughing is no longer regarded with such

favour as was at one time the case. The best soil is at the top, and that the microorganic life which exercises such ar, important function in promoting the process of plant-growth is chiefly to be found in the surface portion, and cannot develop freely in the deeper soil-layers. It is true that certain substances, such as lime, when applied to the soil, have a tendency to sink down, and that deep ploughing serves to bring them to the surface. Subsoiling, combined with moderate ploughing, is the best treatment for heavy soils.

IMPROVEMENT OF SOILS BY MIXING

It has been already shown that the physical properties of the soil have an important influence upon its average fertility. The admixture of pure sand with clay soils produces an alteration which is often beneficial, and which is almost wholly physical. The sand opens the pores of the clay, and makes it more permeable to the air.

The admixture of clay with sandy or peaty soils, however, produces both a physical and a chemical alteration. The clay not only consolidates and gives body to the sand or peat, but it also mixes with them certain earthy and saline substances, useful or necessary to the plant, which neither the sand nor peat might originally contain in sufficient abundance. It thus alters its chemical composition, and fits it for nourishing new races of plants.

Such is the case also with admixtures of mark of shell-sand, and of lime. They slightly consolidate the sands and open the clays, and thus improve the mechanical texture of both kinds of soil; but their main operation is chemical; and the almost universal benefit they produce depends mainly upon the new chemical element they introduce into the soil.

IMPROVEMENT BY AGENCY OF VEGETATION

There are certain modes of improving the soil, which, though involving only simple operations on the part of the improver, produce their effects through the agency of refined scientific causes. Such are the improvements produced by planting and laying down to grass.

Lands which are unfit for arable culture, and which yield only a trifling rent as natural pasture, are yet in many cases capable of growing profitable plantations, and of being greatly increased in permanent value by the prolonged growth of wood. Not only, however, do all trees not thrive alike on the same soil,, but all do not improve the soil on which they grow in an equal degree.

The main cause of this improvement is to be found in the nature of the soil, which gradually accumulates beneath the trees by the shedding of their leaves. The shelter from the sun and rain which the foliage affords prevents the vegetable matter which falls from being so speedily decomposed, or from being so much washed away, and thus permits it to collect in larger quantities in a given time than where no such cover exists. The more complete the shelter, therefore, the more rapid will the accumulation of soil be, in so far as it depends upon this cause.

The improvement of the land, therefore, by the planting of trees, depends in part upon the quantity of organic food which the trees can extract from the air, afterwards drop in the form of leaves upon the soil, and in part upon the kind and quantity of inorganic matter which the roots can bring up from beneath, and in like manner strew upon the surface. The quantity and quality of the latter will, in a great measure, determine the kind of greaters a high project are and the

consequent value of the pasture in th feeding of stock.

(1) It causes vegetable matter to ac cumulate on the surface; and, (2) brings up from beneath certain substance which are of vital importance to th growth of plants, but in which the upper soil may have been deficient.

IMPROVEMENT BY THE APPLICATION O

The use of lime is of the greatest im portance in practical agriculture. It ha been employed in the forms of marl, shells shell-sand, coral, chalk, limestone, lime stone gravel, quicklime, etc. in almos every country, and from the most remot period. Many of the older views respect ing the nature of the action of lime arexploded. We now see that its action i in most cases more or less indirect. It i probably seldom that a soil lacks the necessary amount of lime required as a plant food for the crops that grow upon it Its chief action is in ameliorating the mechanical properties of the soil, and it setting free other plant foods such as potash, etc. The fact that it is very des tructive on the organic matters of the soi is another consideration which should render us very cautious in applying i indiscrim!nately. Instead of applying lime, in many cases, it is found better policy to apply artificial manures. Great though the benefits of lime undoubtedly are, it will be best to apply it chiefly to soils whose mechanical conditions are such as will greatly be improved by it, to new land where it is simply indispensable. and to soils extremely rich in peat and organic matter. Its use, on the other hand, to land in a high state of cultivation except in very small quantities, is not to be recommended as a rule.

The quantity of quicklime laid on at

ch it may be repeated, depend upon kind of land, upon the depth of the upon the quantity and kind of vegale matter which the soil contains, and on the species of culture to which, it is jected. If the land be wet, or badly ined, a larger application is necessary produce the same effect, and it must more frequently repeated. But when e soil is thin, a smaller addition will oroughly impregnate the whole, than here the plough usually descends to the both of 8 or 10 inches. On old pasturends, where the tender grasses live in 2 3 inches of soil only, a feeble dressing ore frequently repeated, appears to be he more reasonable practice; though in eclaiming and in laying down land to rass, a heavy first liming is often indisensable.

The most remarkable visible alteraions produced by lime arc,—upon pasturis, a greater fineness, sweetness, closeness,
and nutritive character of the grasses—on
rable lands, the improvement in the texture and mellowness of stiff clays, the more
productive crops, their better quality
and the earlier period at which they ripen,
compared with those grown upon soils to
which no lime has ever been added. It
is said to destroy sorrel.

This influence of lime is well seen when limed is compared with unlimed land, or when soils which are naturally rich in lime or compared with such as contain but little. Barley grown on the former is of better malting quality. The turnips of well-limed land are more feeding for both cattle and sheep. And the hillpastures on limestone soils, continue longer green in autumn, and yield a greater yearly return of milk and cheese, than the soils which are produced from sandstone rocks.

.It is known that the frequent addition

of lime, even to comparatively stiff soils long kept in arable culture, will at length so open them that the wheat crop becomes uncertain.

To lighter soils, again, and especially to such as are reclaimed from a state of heath, and contain much vegetable matter, the addition of a large dose of lime opens and loosens them, often to such a degree that they sound hollow, and sink under the foot. This effect is usually ascribed to an overdose lime, and the land is commonly said to be over-limed. In this state it refuses to grow oats and clover, though turnips and barley thrive well upon it.

Analyses of over-limed soils have shown that it is not an excess of lime which produces the evil, but a too porous or loose condition of the soil, which admits of the following remedies:—

- (a) To eat off the turnips produced upon such soils with sheep; or,
- (b) To consolidate the loose and open soil by the use of a heavy roller, a cold-crusher or peg-roller, or other similar mechanical means, or,
- (c) To use the cultivator as much as possible instead of the plough, and thus to avoid the artificial loosening of the soil which is caused by frequent ploughing.

The way in which lime acts on the texture of a soil is a most interesting, but as yet little understood, subject. The chief difficulty in understanding it is owing to the complicated nature of this action.

One of the most important properties of lime is the power it has of lessening the pudding tendency of a clayey soil. This it does by coagulating the finely divided clayey particles a property which has led to the use of lime as a precipitant of sewage.

IMPROVEMENT BY PARING AND BURNING

A mode of improvement more often formerly resorted to than now on poor

loods in the paring and burning of the surface. The effect of this treatment is easily understood. The matted sods consist of a mixture of much vegetable with a comparatively small quantity of earthy matter. When these are burnt, the ash only of the plants is left, intimately mixed with the calcined earth. To strew this mixture over the soil is much the same as to dress it with peat or wood ashes, the beneficial effects of which are almost universally recognised. And the favourable influence of the ash itself is chiefly due to the ready supply of inorganic food it yield to the seed, and to the effect which the potash and soda, etc., which it contains, exercise either in preparing organic food in the soil, or in assisting its assimilation in the interior of the plant.

Another part of this process is, that the roots of the weeds and poorer greases are materially injured by the paring, and that the subsequent dressing ashes is unfavourable to their growth.

CHANGES PRODUCED BY BURNING CLAYS

When a soil is burnt, the organic portion of it is altogether, or nearly altogether. destroyed; the combustible (volatile) portion escapes into the atmosphere in the form of water, carbonic acid. etc., whilst its earthy and saline constituents remain in the soil in the form of a powder more or less fine. The soil loses nearly all its nitrogen in this way, and hence burning must be regarded as only advisable in very exceptional cases. In fact this method of improving soil is very rarely had recourse to now-a-days, as there are other more suitable and economical methods in use. Nevertheless it may be of advantage to describe the nature of the relations which take place in such treatment of soils. The saline and earthy substances derived from the comhistlen of the organic matter are of course

identical with the mineral constituent plants: being in a pulverulent condithey are the more readily absorbed by growing vegetables.

In all soils capable of nourishing e the most worthless weed, there must potash. This substance exists in soils the most part in combination with sili and in such a form as to be insoluble the solvents present in soils. That though there may be abundance of pot: in the soil, yet it is mostly insoluble, a not immediately available for the nouris ment of plant. By the action of frosts a by other agents, the rocky portions of t soil in which the potash is bound up ! come broken up and reduced to powde during this operation potash is gradua set free, so to speak, and placed at t disposal of the plant. Burning the s expedites its disintegration and liberanot only its potash. but some of its oth constituents. In an experiment made Dr. Voelcker, he found that unburnt cl contained 0.269 per cent of soluble pota: whilst the same clay after burning co tained 0.941 per cent of potash soluble acidulated water. One most imports change produced in soils by burning therefore a great increase in the amou of soluble potash.

It would appear that it is lime whi displaces potash from its combination wi silica, when the potassium silicate of so is highly heated. Burning, therefore, minishes the amount of calcium carbona in soils. In the first place; carbonic ac is expelled from the carbonate (CaCO₃ CaO×CO₂), and caustic lime thereformed decomposes the silicate of potasium, producing free potash and calcius silicate. It may happen, too, that part the calcium carbonate directly decompose the silicate, forming, by double decomp

ate, as suggested by Voelcker. Soda not in general so abundant in soils as sh; but, when it is present, its soluble tion is increased by the operation of ning. Where much limestone is pret in a soil, burning, by effecting its integration, renders any phosphates it y contain more available.

IMPROVEMENT BY IRRIGATION

The irrigation of the land is only a bre refined method of manuring it. The ture of the process itself, however, is ferent in different countries, as are also e kind and degree of effect it produces, in the theory by which these effects are be explained.

In dry and arid climates, where rain rely falls, the soil may contain all the ements of fertility, and require only later to call them into operation. In such uses—as in the irrigations practised so attensively in Eastern countries, and without which whole provinces in India hould lie waste—it is unnecessary to uppose any other virtue in irrigation than he mere supply of water it affords to the arched and cracking soil.

But in some climates there are several other beneficial purposes in reference to the soil, which irrigation may, and some of which at least it always does serve thus.

The occasional flow of pure water pver the surface, as in our irrigated meadows, and its descent into the drains, where the drainage is perfect, washes out acid and other noxious substances naturally generated in the soil, and thus purifies and sweetens it. The beneficial effect of such washing will be readily understood in the case of peat-lands laid down in water-meadow, since, as every one knows, peaty soils abound in matters infavourable to general vegetation. These

substances are usually in part drawn off by drainage, and in part destroyed by lime and by exposure to the air, before boggy lands can be brought into profitable cultivation.

NATURE OF DRAINAGE WATERS

But it seldom happens that perfectly pure water is employed for the purposes of irrigation. The waters of rivers. they are diverted from their course for this purpose, are more or less loaded with mud and other fine particles of matter, which are either gradually filtered from them as they pass over and through the soil, or, in the case of floods, subside naturally when the waters come to rest. Or in less frequent cases, the drainings of towns and the water from common sewers, or from the little streams enriched by them, are turned with benefit upon the favoured fields. These are evidently cases of gradual and uniform manuring.

Even where the water employed is clear and apparently undisturbed by mud, it almost always contains ammonia, nitric acid, and other organic and saline substances grateful to the plant in its search for food, and which plants always contrive to extract, more or less copiously, as the water passes over their roots. The purest spring-waters and mountain-streams are never entirely free from impregnations of mineral and vegetable or animal matter. Every fresh access of water, therefore, affords the grass in reality another liquid manuring.

The kind of saline substances which spring-water or that of brooks contains depends upon the nature of the rocks or soils from which it issues or over which runs. In countries where granite or micaslate abounds, potash and soda, and even magnesia, may be expected in notable quantities; while in limestone districts the

waters are generally charged with lime. The value of the mountain-streams for the purpose of irrigation in limestone districts is so well known, that some have been inclined to undervalue all the constituents of natural waters, and to ascribe little worth as irrigators to the clear waters of brooks and springs which are not rich in lime. This opinion, however, is not in accordance with the results of the analysis of waters which have been profitably employed for irrigation.

Flowing water also drinks in from the air, as it passes along, a portion of the oxygen and carbonic acid of which the atmosphere in part consists. These gaseous substances it brings in contact with the leaves at every moment, or it carries them down to the roots in a form in which they can be readily absorbed by the parts of the plant. It is not only unlikely that, in consequence of this mode of action, even absolutely pure water would act beneficially if employed in irrigating the soil.

Further, the constant presence of water keeps all the parts of the plant in moist state, allows the pores of the leaves and stems to remain open, retards the formation of hard woody fibre, and thus enables the growing vegetable, in the same space of time, to extract a larger supply of food, especially from the air. In other words, it promotes and enlarges its growth.

In the refreshment continually afforded to the plant by a pientiful supply of water—in the removal of noxious substances from the soil in the frequent additions of enriching food, saline, organic or gaseous, to the land in the soft and porous state in which it retains the parts of the plant, the efficiency of irrigation seems almost entirely to consist.

It is known that waters which have

sensibly less fertilising. This is easily explained by the reasonable suppo-ition that the plants among which they have flowed have deprived them of a portion of their enriching matter.

IMPROVEMENT BY ROTATION OF CROPS

The experiments of Lawes and Gilbert show that soils become exhausted of certain of their constituents sooner than of others. The substance which disappears soonest in the case of certain kinds of cropping is nitrogen; but there are other crops which deal gently with the nitrogen; and drawn largely upon some of the mineral ingredients of the soil. During the growth of leguminous crops, nitrogen accumulates in the surface-soil.

If two crops of unlike kinds be sown together, their roots retain the inorganic substances of the soil in different proportions, the one more potash and phosphoric acid perhaps; the other more lime, magnesia, or silica. They thus interfere less with each others than plants of the same kind do which require the same kinds of food in nearly the same proportions.

Or the two kinds of crop grow with different degrees of rapidity or at different periods of the year: while the roots of the one are busy drawing in supplies of inorganic nourishment, chiefly from great depths, those of the other are only able to take up food from the surface-soil.

If each crop demands special substances, or these substances in quantities peculiar to itself, or in some peculiar state of combination, the chances that the sor will be able to supply them are greater the more distant the intervals at which the same crop is grown upon it. Other crops do not demand the same substances in the same proportions; and thus they may gradually accumulate in the soil till it becomes especially favourable to the

ippose the soil to contain a certain ge supply of all those inorganic tances which plants require, and that same corn crop is grown upon it for a series of years, this crop will carry some of these substances in larger portion than others, so that year by r the quantity of those which are thus efly carried off will become relatively s. Thus at length the soil, for want these special substances, will become able to bear a good crop of this kind all, though it may still contain a large ore of the inorganic substances which her plants do not specially exhaust. uppose bean or turnip crops raised in ke manner for a succession of years, they rould exhaust the soil of a certain set of ubstances till it became unable to grow hem profitably, though still rich perhaps n those things which cereals especially lemand.

But grow these crops alternately, then he one crop will draw especially upon one class of substances, the other crop upon another; and thus a much larger produce of each will be reaped from the same soil, and for a much longer period of time. On this principle the benefit of a rotation of crops in an important degree also the capacity of different crops for obtaining their food constituents. It is therefore, not merely the amount of these food constituents which the different crops remove from the soil that has to be taken into account in considering the effect of the rotation of crops, but also the capacity which they possess for absorbing their food from the soil, and in this respect crops differ very markedly. Another important point in considering the rotation of crops is the nature of the cron-residue. This is the chief source of the humus matter in the soil. In this respect crops differ very considerably. Those leaving

the least amount of residue are the rootcrops; while those leaving most are clover and grass. Cereals leave a considerable amount of residue, but the quality of this in fertilising a constituent is poorer than in the case of grass, which enriches the soil to a very considerable extent in nitrogen.

IMPROVEMENT BY MANURING

In a state of nature there is a process of enrichment going on in every soil. The surface-soil becomes enriched by a steady accumulation of the elements of fertility. This is due to the fact that the plants growing on the soil collect, by means of their roots, fertilising matter from the deeper soil-layers. At the same time, a certain increase in the total nitrogen of the soil takes place, due to that coming from the atmosphere. This process of enrichment of a soil in nitrogen may go on for a long time. It would seem, however, that there comes a time when the loss by drainage becomes equal to the amount gained from the air, and the amount of nitrogen in the soil no longer increases. When, however, land is under arable cultivation, there is a constant loss of fertilising constituents due to that removed in crops. But the quantity of mineral matter which even the most exhaustive crop removes from the soil is extremely small when compared with the amount which the crop leaves untouched. If. however, crop after crop be taken from the soil, and if no manure be given in return for the matters abstracted therefrom, can such a system be carried on for an indefinite period? Baron Liebig was one of the first to point out that it could not, and that such a system must inevitably, in a state of nature, result in the exhaustion of the land. Indeed in many of his valuable works the great German chemist has drawn very gloomy pictures of the future condition of agriculture in most civilised countries. Large quantities of food substances consumed in towns, and the effete matters which result therefrom, instead of being returned to the soil from which they were procured, are in the form of sewage discharged into the ocean, and lost to agriculture,

NEED OF MANURING

By repeated growing of crops the nutritive value of the soils decreases. The crops produced upon a farm take out of its soils certain quantities of mineral matters and nitrogen. So to keep these matters in the soils a judicious application of manures is indispensable. The amount of the proper manure to be added to the soil may be known by the chemical analysis of the soil before cultivation, which we now discuss.

CHEMICAL ANALYSIS OF SOIL

Before proceeding to describe the method of soil analysis, we must first find out what substances in the soil are of importance to plants, since the object of analyzing a soil is to determine its fertility, i.e. the amount of plant food substances contained in it.

We have already acquainted with the fact that all plants contain a certain quantity of inorganic material called the ash. and by the ordinary methods of qualitative analysis we can prove that plant ash invariably contains the following substances-Lime, magnesia, potash, soda and ron oxide; phosphoric, hydrochloric, sulshuric and carbonic acids; and silica. With the exception of carbonic acid, these ubstances do not exist in the air, and the lant must therefore get them from the sil. The relative amounts of these subsnces in plant ash vary greatly according the plant, or the organ from which the is obtained. Broadly apeaking, the h of seeds contains much line and phosphoric acid, that of stems and leaves, as straw or hay, much potash and the and that of wood much potash and carb nic acid. Lime, potash and phosphot acid are the most abundant constituent magnesia, soda, iron oxide, and hydrochloride and sulphuric acids are usuall present in comparatively small quantitie. Carbonic acid in the ash comes from the burning of the plant's carbon in the process of incineration, while silica is so abundant in every soil that there is not need to estimate its percentage.

NEEDS OF PLANTS FROM SOIL

The most important substances therefore which the soil has to provide for plants are lime, potash, and phosphoric acid. But by examining only the ash, we have omitted to notice another very important constituent of plants which has to be obtained from the soil-nitrogen. This; element exists in the air, but in the free state, and it has been proved that most crops cannot directly use it in this state, but must obtain it in the form of compounds from the soil. The amount of nitrogen in plants is large, and we must add it to lime, potash, and phosphoric acid, in our list of the important substances to be supplied to the plant by the soil. In analyzing a soil for practical purposes, these four substances are the chief ones to which we must direct our attention.

In making an analysis of a soil, we may go to work from either of two points of view:— (1) To find out how great a store of plant food substances the soil contains, in which case we require to find the total percentages of lime, potash, phosphoric acid and nitrogen present. (2) To find out the amounts of each of these substances available for plant food at the time of taking the sample. This is a much more difficult matter than to determine the total quantities, for we are not as wet

h plant food substances are dissolved of the soil for absorption by the roots. The total percentage are determined follows:—

10 grams of the fine dry soil are ghed out into a crucible and dried at C. until there is no further loss of ght. The total loss of weight gives amount of moisture in the fine soil.

ORGANIC MATTER

The soil in the crucible is then ignited it over a small flame, which is gradually med up until the crucible is raised to a ll red heat. During the heating the soil occasionally stirred with a stiff platinum re. The treatment burns off all the ganic matter humus the percentage of hich is calculated from the loss of weight.

OTASH, LIME AND PHOSPHORIC ACID

The ignited soil is now transferred to beaker, and boiled for half an hour with c.c. of a mixture of strong hydrochloric eld and water, half and half. More ater is then added, and the whole is bured on to a filter and washed with hot rater. The filtrate is made up to a known olume, say 500 c.c. The lime, potash, tc., are then determined in portions of 100 c. by the ordinary methods of quantitative analysis.

INSOLUBLE POTASH

The whole of the lime and phosphoric icid is dissolved by this method, but hylrochloric acid does not extract the whole of the potash. To get all the potash into olution, 10 grams of soil is mixed with ture calcium carbonate and ammonium hloride in a platinum crucible slowly aised to a red heat and kept, at that temerature for an hour. The crucible is hen allowed to cool and the contents is oiled in water, when all the potash disolves, and can be estimated in the redinary way.

TOTAL NITROGEN

To determine the total nitrogen, 10 grams of soils is mixed with soda-lime, and heated in a hard glass tube, the ammonia given off being estimated by any of the usual methods.

In this way we can determine the percentages of water, organic matter, lime, potash, phosphoric acid and nitrogen present in the fine soil.

The percentage of water is required simply to enable us to calculate the percentage of the other substances in the dry soil so that the numbers obtained may be comparable. Suppose, for instance, we find that the fine soil contains 1.35 per cent. of water, then 100 grams of fine soil contain 100—1.35 grams = 98.65 grams of dry soil. Suppose we find that the percentage of potash in the fine soil is .67, we must divide this number by .9865 to get the percentage in the dry soil. Thus percentage in fine soil, .67, divided by .9865 = .68, percentage in dry soil.

The percentages of each constituent may be calculated into lbs. per acre-

Amount of fine dry soil per acre = 2,439,360 lbs.

Percentage of potash in dry soil as above—.68

Amount of potash per acre 2.439.360

$$=$$
 \times .68 lbs. = 16.600 lbs.

When this method of sampling has not been followed, we may take it as near enough for practical purposes that one acre of dry soil nine inches deep weighs 3,000,000 lbs., and we shall therefore get the weights per acre of each constituent by multiplying the percentage by 3,000,000 i.e., by 30,000. Thus, suppose percentage of phosphoric acid is found to be .185: then weight of phosphoric acid per acre = .185×30,000 lbs. = 5550 lbs.

In agricultural analysis of either soils or manures, lime is always expressed as Ca0, potash as K₂0, and phosphoric acid as P₂0₅.

AMOUNT OF PLANT POODS IN SOILS

The amounts of lime, potash, etc., found by analysis are very variable.

Lime varies from as much as 30 per cent. or more in marls, to less than .5 per cent. Soil containing less than 1 per cent. may be regarded as deficient in that substance.

Potash in clay soils may be as much as 1 per cent., and occasionally rather more, but in light soils it is sometimes less than .1 per cent.

Phosphoric acid varies from about .3 per cent. to less than .1 per cent.

Nitrogen amounts to about .2 per cent. in old pastures, but only to .05 per cent. in some arable lands.

AVAILABLE PLANT FOOD

To estimate the percentages of plant food substance available in the soil at any time is a very difficult matter. Our knowledge of the exact manner in which food salts are dissolved by the soil water for absorption by the root-hairs is not as complete as it might be, nor are we sure that it is the same in all plants. At any rate, the powers possessed by different crops of extracting, say, phosphoric acid from the soil are very different. A soil which contains plenty of phosphoric acid available, say, for wheat, may produce but a poor crop of swedes unless largely dressed with some phosphatic manura The whole question of availability is therefore a very difficult one in the present state of knowledge. Many attempts have been made to determine the amounts of minerals, i.e., potash and phosphoric acid. available in a soil, such as determining the amounts soluble in dilute hydrochloric acid,

acetic acid and other acids, but the m scientific suggestion is that made quite cently by Dr. Bernard Dyer. Start from the botanical side of the question, argues that if the root hairs exude an a juice, which exerts a solvent action on food substances in the soil particles, amounts of these substances available the plant must depend on the acidity of root juice exuded. He has determined acidity of the root juices of all the or nary agricultural plants, and finds that is equivalent on the average to the acid of a one per cent. solution of crystallicitric acid.

He has determined the amounts potash and phosphoric acid soluble in chacid solution of this strength present the soils of the various plots from Rothamsted permanent barley field, a finds that the amounts soluble agree visuall with the amounts of available potal and phosphoric acid, as indicated by known manuring and crop result of eaplot.

The method has also been applied the soils of a number of experimer fields in Norfolk and Suffolk, and amounts of potash and phosphoric a dissolved by the one per cent. citric a solution have agreed in every case we the amounts indicated as available by field experiments.

It therefore appears probable that to method will give us an idea of the amout of mineral food substances available it soil at any time, though there are still a tain difficulties in its practical applicat such as the varying availability to different crops.

The method of procedure is to put i a clean Winchester quart 200 grams fine dry soil, 2 litres of water, and grams of crystallized citric acid, and allow them to stand for seven days w occasional shaking. At the end of the time the solution is filtered off, and two lots of 500 cc. evaporated down to dryness and ignited to burn off the citric acid. The potash is determined in one and the phosphoric acid in the other by the ordinary methods.

AVAILABLE NITROGEN

The availability of the nitrogen in the soil varies greatly according to the time of year, the amount of rainfall and drainage, and the crop growing on the soil.

At any time most of the nitrogen exists as humus, in which form it is of course insoluble in water, and therefore not available for plant food.

 Under the proper conditions, however, the humus undergoes a series of changes, which will be more fully dealt with later, which convert its nitrogen first into ammonia compounds and then into nitrates.

It is usually accepted that plants absorb their nitrogen from the soil in the form of nitrates, chiefly nitrate of lime, so that to determine the amount of nitrogen available; we must determine the amount of nitrogen present as nitrates. But ammonia changes to nitrates so rapidly in the soil, that nitrogen in the form of ammonia may also be taken as available. Since changes in the state of the nitrogen occur in a soil on keeping, both nitrates and ammonia must be estimated in a perfectly fresh, undried sample.

EXTRACTION OF NITRATES

The percentage of nitrogen as nitrate in a soil is determined as follows:—500 grams of the soil is placed in a deep funnel at the bottom of which is a perforated porcelain plate covered with a filter paper. 50 c.c. of water is poured on to the soil, and allowed to stand for five or ten minutes. The funnel must be inserted through a cork into a bottle with a side tube which

can be connected with an air-pump. The pump is set to work, and the water sucked out of the soil into the bottle. A second 50 cc. is now added, and sucked through as before. The nitrates so are soluble and easily washed out of a soil, that the water sucked through carries with it all the nitrates, which can then be estimated, after evaporating the solution, by any of the ordinary methods. The amount of nitrogen found as nitrate will vary with the time of year, the temperature, the rainfall, etc.

ESTIMATION OF AMMONIA IN SOILS

The ammonia present in a soil at any time may be determined as follows:-200 grams of the soil is placed in a flask connected with a condenser, two litres of water perfectly free from ammonia is added, with two grams of magnesia. 500 cc. of water is distilled from the flask into a receiver containing a measured volume of standard sulphuric acid. The ammonia can then be estimated from the amount of acid neutralized, and so we can calculate the percentage of nitrogen as ammonia contained in the soil. The percentage found will vary greatly, as in the case of nitrates.

The nitrogen as nitrate, added to that as ammonia, may be taken as the total nitrogen available at the time of sampling the soil.

After chemically analysing the soils one may be able to ascertain the food requirements of a particular crop and then apply the suitable mannure to the soil to supply the food of the plant for its nourishment and growth. A brief description of food requirements of crops is given below.

FOOD REQUIREMENTS OF CROPS

The amount of fertility removed from an acre of soil producing average crops varies between wide limits. Crops which

remove the most fertility do not always require the most help in obtaining their food. This is because the amount of plant food assimilated is not a measure of the powers of crops to obtain food. An acre of corn requires over twice as much nitrogen as an acre of wheat, but wheat often leaves the soil in a more improverished condition than corn, because corn has greater power to procure nitrogen and utilize that formed by nitrification after the wheat crop has completed its growth. The available nitrogen if not utilized by a crop may be lost in various ways. It was formerly believed that plant food in the matured crop indicated in kind and amount of fertilizing ingredients to apply and that a correct system of manuring required a return to the soil of all elements. removed in the crop. Experiments show this view to be incorrect. For example, an acre of wheat contains 35 pounds of nitrogen, while an acre of clover contain 70 pounds, if 70 pounds of nitrogen were applied to an acre of clover and 35 pounds to an acre of wheat, poor results would follow, because clover can obtain its own nitrogen while wheat is unable to do so, and the 35 pounds would not necessarily come in contact with the roots so that all could be assimilated. While the amount of plant food removed in crops cannot serve as the basis for their manuring valuable results are obtained from study of the different elements of fertility which they contain. Moreover, the influence of the crop upon the soil and the power of the crop to obtain its food, must also be considered.

It is believed that crops procure some of their food from minerals insoluble in water. It is a fact that plants have the power of rendering a portion of their food soluble, provided it does not exist in forms too inert to undergo chemical change. According to the experiment of Liebig it

was found that 92 per cent of the potas was obtained from form insoluble in wate

The soluble plant food from a fertil soil is not generally sufficient for plan growth. When oats, wheat, and barle are seeded in prepared sand and watered with the hacking from a pot of fertile soil they made only a limited growth. Oatgrown in prepared sand and watered with soil haching assimilated only 25 per cent as much phosphoric acid as plants grown in fertile soil. The character and concentration of the soil solution are, however, important factors in crop production and some soils may contain sufficient amounts of water soluble elements to produce crops. The relative amounts of food which plants take from the soil solution and that which they render soluble have not been extensively investigated.

In the roots of the plants there are various organic acids and salts. Between the roots and the soil is a layer of water. The plant sap and the said water are separated by plant tissue, which serves as a membrane. All of the conditions are favourable for osmosis. The sap from the roots finds its way into the soil in exchange for some of the soil water. The acid and other compounds, excreted by the roots, act upon the mineral matter, rendering portions of it soluble, and then it is taken up by the plant. Different plants contain different kinds and amounts of solvents. as well as present different areas of root surface to act upon the soil, and the result is that agricultural crops have different powers of assimilating food. This action of living plant roots upon soil is a digesfion process which is somewhat akin to the digestion of food by animals.

Plants not only possess the power of rendering a portion of their food soluble, but also they are able to select, and to reject that which is unnecessary. For example, wheat grown on a soil with the

equally abundant and soluble forms as potash will contain relatively little soda appared with the potash; also many seateds contain more potash than soda, alough the sea water in which they grow an excess of sodium salts.

For the feeding of crops, a nutritive I solution is desirable, and the soil ould have a good stock of reserve matel that can be utilized either by action the plant roots or readily pass into ution in the soil water.

CEREAL CROPS

Cereal crops contain a high per cent of ca and evidently possess the power of ding upon some of the simpler silicates the soil, liberating the base elements I using them as food, while the silica is posited in the outer surface of the straw. though the cereal crops do not remove ge amounts of total nitrogen from the l, require special help in obtaining this ment. There is, however, a great dience among the cereals as to power of imilating nitrogen. Next to nitrogen y stand most in need of phosphoric d. There exists in many soils a greater iciency of available phosphoric acid I potash than of nitrogen, although eal crops are better able to procure se elements than they are of nitrogen. e humic phosphates are utilized by rly all the cereals.

WHEAT

This crop is more exacting in its food uirements than barley, oats or rye. It comparatively a weak feeding crops, I the soil should be in a higher state fertility than for other grains.

The food requirements of wheat are h that it should be given a favoured ition in the rotation. It is not advisable have wheat follow barley, because the will be too porous, and barley being

a stronger feeding crop leaves the land in a poor state as to available plant food. When corn has been well-manured, wheat may follow. The food requirements of wheat are best satisfied following a light, oats, which have been grown on heavy sod, or following corn that has been well manured. When wheat is judiciously grown in a rotation and farm manures are used, it is not an exhausting crop. Light dressings of farm manure may be used on land that is being prepared for wheat. On many soils, dressings of phosphate and potash, either alone or in combination, materially increase the yield and improve the quality of the crop. Nitrogen alone does not give as good results as when combined with minerals.

RICE

The growth of paddy requires water. As a rule manure is not considered essential, when water is sufficient, unless the land is poor. But the production may be increased by the application of, fertilizers such as bone meal, kainit and farm vard manure. Assuming the average yield to be about 900 lbs per acre neglecting the amounts absorbed by the stubble and the roots, such a crop removes the soil about 29.33 lbs nitrogen, 9.14 lbs phosphoric acid and 49.69 lbs potash. So the addition of 1 to 11 cwt. of bone dust and 11 cwt kainit to the ordinary 4 or 5 tons of cattle manure on well-cultivated wet lands will produce brun per crops and on dry lands a mixture of 1 cwt bone dust and 1 cwt. kainit will prove equally successful and ashtonish the surrounding farmers by the weight and the excellence of the crops. Where cattle manure are not available 3 to 5 cwt of groundnut or castor cake meal, 1 cwt of bonedust and 1 to 2 cwts, of kainit should be employed. carefully mixed, and spread evenly over the field after the grasses have rotted, and

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the return will be so great as not merely to pay for the cost of the manures, but there will be an extra profit.

BARLEY

While wheat and barley belong to the same general class of cereals, they differ greatly in the habits and food requirements. Barley is a stronger feeding crop. has greater root development near the surface, and can utilize food in a cruder form. Barley thrives best on a open soil, and has greater nitrogen assimilative power than wheat. Barley, however, responds liberally to manuring, particularly to nitrogenous manures.

OATS

Oats can obtain food under more adverse conditions than either barley or wheat. They are also less exacting as to the physical condition of the soil. The oat plant will adopt itself to either sandy or clayey soil, and will thrive in the presence of alkaline matter or humic acid when wheat would be destroyed. In a rotation, oats usually occupy a position less favoured by manures, they are, however, greatly benefited by fertilizers, particularly those of a nitrogenous nature. The oat crop responds liberally to manuring.

MAIZE

Under ordinary conditions maize a quires most help in obtaining phosphoric acid. It removes a large amount of gross fertility, and if its production, is long continued without the use of manures it impoverishes the soil. Its habits of growth is met that it generally leaves an average soil in better mechanical condition for succeeding crops. Maize is not injured as are many grain crops by heavy applications of stable manure and does not produce waste products which are destructive to itself. The conditions are better for wheat culture after one or two corn crops have been

removed from richs newly broken. The food requirements of maize are sa fied by applications of stable many occasionally re-enforced with a little not gen and phosphoric acid, and in the coof some soil potash. After clover, congives excellent returns, and when many the chief market crop it should be to roused by having the best position in the rotation.

POTATOES

Potatoes are surface feeders, and whegrown continuously upon the same soil
without manure, the yield per acre de
creases more rapidly than that of any
other farm crop. Potatoes require libera
general manuring re-enforced with wook
ashes or other potash fertilizer. In the
totation they should follow grain or pasture, provided the fertility of the soil re
kept up. Commercail fertilizers for potatoe production should contain a fair amoun
of available nitrogen (2 to 3 pecent) and a more liberal supply of phos
phoric acid and potash.

COTTON

On average soils cotton stands in need first of phosphoric acid and second w nitrogen. It is most able to obtain potash Organic nitrogen as cottonseed meal and stable manure appear equally as effective as nitric nitrogen. Phosphoric acid mube applied in the most available forms, although the crop uses but little. The fertilizers should be drilled in at the time of planting. The use of green manuring crops as cowpeas, with an application of marl or limestone gives beneficial results There are but few crops which respond so readily to fertilizers as cotton. It does not remove a large amount of fertility, but when not systematically grown in a rotation exhausts the soil in the same way, as when grain is grown confinuously.

LEGUMINOUS CROPS

ter leguminous crops potash and lime ters have been found of special. Farm manure on sandy or heavy soils will materially assist in the duction of clover.

SUGARCANE

Sugarcane grows in all kinds of soils t the best canes grow at the junction of I and new alluvia on the sides of streams d rivulets. These are red clay loam Is specially rich in mineral matters. For wing superior varieties of canes the I should be supplied with a quantity of redust and mineral phosphate, which ould be applied to the one in 5 years the rate of 10 maunds per acre. The ility may also be increased by the uses sulphate of ammonia or saltpetre. But sphatic manure is indispensable for sucane in addition to cattle-dung, oil-cake, where the land is annually renovated silt, and where such land is utilised for wing an aquatic variety of sugarcane, special manuring is needed.

JUTE

With the exception of rocky, laterite poor sandy soils, all soils are adopted jute cultivation. Rich loam, of course, is the best result. The coarse varieties w luxuriantly in low lying lands, but a er quality of fibre is obtained from sland. Pulses, oats, barley, wheat, to-co and Aus paddy are grown on such is in rotation. Where there is net osit no manuring is required. Elsever cowdung at the rate of 150 maunds acre may be applied where necessary. fibre crops are appreciably benefited cowdung manure, except those belongto the leguminous order.

TOBACCO

Tobacco requires particularly good and heavy manuring, as it is richer in Vos. XLIL. No. 493.

nitrogen and in mineral constituents than almost any other crop. The most appropriate manures for the cultivation of to-bacco crop are wood ash, saltpetre, gypsum, and superphosphate of lime.

TEA

Tea is an exhausting plant. The exhaustion should be covered by the application of suitable manure. The manures specially applicable to this crop are saltpetre and castor cake. But rape-cake, ashes, lime, salt, soot, alum, sulphate of copper, catechu, etc., and especially the first five which have manurial value, should be applied, as well as saltpetre or castor-cake, for renovating the soil and ridding it of insect and fungus pests.

GARDEN CROPS

For general garden purposes, there should be a liberal supply of plant food. Well-composted farm manure can advantageously be re-enforced with commercial fertilizers. A liberal use of manure insures not only the maximum yield, but crops of the best quality. Maturity of crops also is influenced by fertilizers. A suitable fertilizer for general garden purposes may contain the following:—

Nitrogen	4	р. с.
Phosphoric acid	8	19
Potash	10	
Farm manure		rest.

To meet the requirement of special crops such as cabbage, etc. an additional dressing of nitrate of soda may be used.

For early maturing garden crops, a fair but not excessive amount of nitrogen should be applied, also a liberal supply of phosphates will be found advantageous. Some garden crops thrive best when their food is in organic forms as the humate compounds derived from farm manuses. A continuous supply of available plant food is thus furnished to the growing exogn

Onions are benefited by a generous dressing of soluble nitrogen. Tomatoes require general fertilizing, for early maturity, nitrogen, as nitrate of soda, is beneficial, but an excess should be availed; for late maturity, farm manures may be used. For general garden purposes, a complete fertilizer is preferable to an amendment, as a better balanced growth is secured which favourably affects both the yield and the quality.

FRUIT TREES

In the manuring of fruit trees, the first object is to produce thrifty trees, as subsequent fertilizing for fruit will not give satisfactory results with poorly grown and partially developed trees. In order to promote growth, a liberal supply of a complete fertilizer should be used, and the soil should be kept in the best mechanical condition. The quality of the fruit is often adversely affected by a scanty supply of plant food. A quick acting fertilizer, containing kainit. nitrate of soda, and dissolved phosphate rock, should be used in the spring, followed if necessary by a light dressing of some manure which yields up its fertility more slowly. An excess of nitrogen, however, should be avoided. Stone fruits are benefited by the addition of lime to the ferilizer. Lime fertilizers impart hardiness to fruit trees.

SMALL FRUITS

On account of the camparatively limited bearing period of small fruits, the land should be brought to a high state of productiveness and good physical condition by liberal use of farm manures previous to planting. Quick acting fertilizers are the most suitable for small fruits. Dressing of nitrate of soda 50 to 100 lbs per acre can be applied early in the season to promote leaf activity. This should be followed by an application of a general fertilizer containing about 3 per cent of available

nitrogen, 8 per cent of phosphoric ac and 10 per cent of potash. The amou used should range from 200 to 400 lbs p acre until the character and needs of 11 soil are determined.

ROTATION OF CROPS AND CONSERVATION OF SOIL PERTILITY

The object of systematic rotation crops is to conserve the fertility of the soand at the same time to produce maximum vields. In order to accomplish this, the food requirements of different crops mube met by good cultivation and judicionmanuring. Rotations must be planned according to the nature of the soil and the system of farming that is to be followed For general grain farming a different rotation is required than for exclusive dairy ing. Whatever the nature of farming, the whole farm should gradually undergo a systematic rotation. If the farm is un even in soil texture, different rotations may be practised on the various parts. There is no way in which soils are more rapidly depilated of fertility than by the continued culture of one crop.

When renumerative crops can no longer be produced, the soil is said to be exhausted. Soil exhaustion may be due either to a lack of plant food, to bacterial products, or to poor physical conditions arising from the soil being temporarily out of a one-crop system and poor methods of cultivation.

PRINCIPLES INVOLVED IN CROP ROTATION

There are a few fundamental principles with which all rotations should conform. Briefly stated these are:—

- Deep and shallow-rooted crops should alternate.
- Humus consuming and humus producing crops should alternate.
- Crops should be rotated so as to make the best use of the preceding crop residue.

Having dealt with the growing of all the major crops we now devote our attention to the cultivation of kitchen vegetables. And for this purpose a reproduction of a chart as recommended by the well-reputed Globe Nursery of Calcutta will surely go a long way in solving this difficult problem.

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. Rains)
Cr &
(Summe)
VEGETABLES
"BRADOF"

				· (empl)		
Name of Grop.	Nature of soil.	Method of sowing or planting.	Period of showing or planting.	Period of harvest.	Seed-rate per acre.	Approximate outturn per
rinjal (Begun)	Well-drained loam.	Й	For early varieties seed- beds should be prepared	Early varieties, August	4 to 6 chhataks	100 to 150 mda.
		varieties in July-August.	in Feb-March & for late	Late varieties, October		
ady's finger	Loam	s should	Middle of April to middle	Middle of June to	3 to 44 seers	60 to 80 mds.
ourd (Lau)	Loam	Seeds should be sown in	Middle of May to middle	After 3 or 4 months	to t seer	100 to 125 mde.
Kumpkin	Loam	Seeds should be sown in	or July. March-April and May	After 3 or 4 months	to a seer	100 to 125 mds.
Chichings).	Loam	Seeds should be sown in	Middle of April to middle	August-September	1 to 1½ seers	90 to 100 mds.
(Ghel Kumra)	Loam	Seeds should be sown in	Middle of February to	After 4 months	1 to 1½ seers	90 to 100 mds.
ours (Bitter) (Karela).	Loam	Seeds should be sown in beds 6' apart	Middle of February to	After 3 months	to 1 seer	90 to 100 mda.
hings (Pala Jatage).	Sandy loam	Seeds 4' to	Middle of April to middle	After 2 to 3 months of	11 to 2 seers	100 to 150 mda.
(entr)	Sandy loam	Seeds are	Middle of March to middle	In the rains	to a seer	80 to 100 mds.
omitry beans (Sheem).	Sandy loam	Seeds are	Middle of May to middle	Middle of November to	44 to 6 seers	90 to 120 mds.
(Bakla Sheem)	Loam	Seeds are	Middle of June to middle	After 3 months	4 to 6 seers	90 to 120 mds.
adish (Mools)	Sandy loam	ñ	Middle of March to middle	After 2 months	2 to 4 seers	125 to 150 mds.
aps Goosebarry (Tepari).	Loam	2' apart	Middle of April to middle	After 4 months	6 to 8 tolas	1
chohhe Note,	Loam All kinds of	3' to 4' apart	Middle of February to	Middle of June to	to 1 seer	100 to 125 mds.
Puis, Dants, Sulfa, etc.	soils.	Seeds are broadcast	Middle of May to July	After 14 months	6 chhataks to	٦.
		"RABI"	VEGETABLES (Winter Season).	near).		
variety).	Loam	. Seedlings, transplanted 2'-24' each away	October to November	After 5 months	4 to 6 chhataks	100 to 150 mels.
these (Shutaye)	Sandy loam	02	Middle of December to	After 2 or 3 months	14 to 2 seers	100 to 150 mds.
	Loam	- Seeds sown 6' apart	Middle of September to middle of January.	After 3 months	to & Beer -	100 to 125 mda.

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Arch — 3.006 to 5,000 160 to 130 mornary to 2 to 1 seer — 106 to 135 mornary = 2 to 4 seers — 125 to 150 mornary = 10 25 morna	Remarks. Frequent waterings with liquid manure are beneficial. Soil should be kept loose. Should be sown in drills, requires a deeply worked soil. Worked up. If will require earthing up. The irrigation is done in the furrows. Pains stand rains much better than imported earth in the furrows.	August, Watering and manuring essential. Soil should be kent loose. Frequent waterings are essential. Heavy manuring and frequent irrigation necessary. Stakes should be put in for the crop to climb up. Flants should be supported by sticks. May be planted on ridgas.
February to Middle of middle of After 2 mon After 3 mon		Plan Plan
September to October to middle of October to middle of September to middle of September to Middle of September to middle of November. September to November.	sown straight Distance between drills and or to be and plants. the land 1' between each seed in rows. the land 2' to 2' respectively cd. 2' each 2' each 2' each 2' each 2' each 2' each 2' each	1' each 1' and 6". 5" to 9" each 2' and 4' to 6". Broadcast 1' and 9" respectively. 24' to 2' respectively. 6" apart
	Whether sown straight to the land or to be raised in seed-beds. Straight to the land Straight to the land in seed-bed. Straight to the land or in seed-bed. Straight to the land or Straight to the land	Seed-bed Seed-bed Seed-bed and also in ground. Straight to the ground Straight to the ground Straight to the ground Straight to the ground
Plented 37	02 07 07 H 00 00	Seed-bed an ground. Straight to the seed-bed and straight to the the straight to the straight s
Cuttings are plante apart. S to 4' apart. Seeds are broadcast Seeds shown 6' apart Seeds are broadcast	Quantity of seed required to sow in 100 yards row. 3 fbs. 3 fbs. 1 oz. 1 oz.	1 0z. 1½ 0z. 3 0z. 3 fbs. 5 0z. 7 0z.
Sendy loam Loam Loam Loam Loam	owing. owing. ember to vember. u s t to vember. t u s t to vember.	Sept. to Nov. 1 Sept. to Dec. 1 October to 3 November. August to 3 December. July to Jan. 8 Sept. to Dec. 3 July to Decem. 4 ber. September to 14
Prof. Police.	Personal (Ranner Personal Pers	

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- 4. Crops should be rotated so as to use nitrogen indirectly from atmosphesources and to promote desirable bacal activities in the soil.
- 5. Crops should be rotated so as to p the soil in the best mechanical condi-
- 6. In arid regions, crops should be lated so as to make the best use of the fl water.
- 7. An even distribution of farm labour ould be secured by a rotation.
- 8. Farm manures and fertilizers ould be used in the rotation where they ll do the most good.
- 9. Rotations should be planned so as produce fodder for stock, and so that ery year there will be some important up to be sold.

In dealing with the subject of rotations is best to take actual problems as they sent themselves and plan rotations that ll best meet all of the conditions.

CONSERVATION OF FERTILITY

In order to conserve the fertility of the l, not only must a systematic rotation practical, but a proper use must be de of the crops produced when crops : sold from the farm and no restoration made, soils are gradually depleted of ir fertility. No soil has ever been and that will continue to produce crops thout the use of manures. Many soils 'e large yields for long periods without nuring, but they are never able to npete in productiveness with similar that have been systematically pped and manured. With a fertile soil e decline in fertility is so gradual that s not observed; careful records are kept the yields from year to year.

The use made of crops whether as id for stock or sold directly from the m determines the future crop producing wer of the soil. With different system of farming different uses are made of crops. when exclusive grain farming is followed there is no restoration of fertility, while in the case of stock farming, the manure produced contains fertility, in proportion to the food consumed. If good care is taken of the manures and in place of the grains sold, mill products are purchased and fed, there is no loss but often a gain of fertility.

Losses of fertility from farms are determined by the products sold, the care of the manure, and the fertility in the materials purchased and used on the farm. If an account are kept of the income and outgo of the fertility it would be found that with some systems the soil is gaining, while with others a rapid decline is occurring. In studying the income and outgoing of fertility, it is necessary to calculate the amounts of three principal elements, nitrogen, phosphoric acid, and potash in the crops and other products sold.

In the handling of manure it is impossible to prevent losses, but it is possible to reduce them to very small amounts. Hence in the calculations, a loss of 3 p.c. is allowed for mechanical waste and for uneven distribution of the manure; that is, in addition to the fertility sold from the farm a mechanical loss of 3 per cent is allowed for all crops raised and consumed as food by stock.

EROSION AND RECLAMATION

Erosion of soils may be caused by water, river and sea waves. It constitutes some of the most spectacular examples of total or partial loss of the soil and all that stands on it. Destruction of forest covers by deliberate human interference leads to increased run off of rain water and its diminished seepage and storage in the soil. The decomposing forest litter is no longer replenished by fresh falls of leaves or decaying roots and plant remains, and the soil organic matter and other plant setting.

ents gradually diminish. The structure of the soil suffers; the run off increases, loosens the soil and transports it, sifting the sand and heavier particles in the process which are deposited near the scene of destruction and the finer parts go to make the streams turbid to be deposited for away. The muddy waters of our rivers carrying large quantities of silt and clay tell their own tale. The soil and all that stands upon it have been lost. And one of the first effects of these is to block the streams. No longer can the rain water be stored to feed the streams gradually over long periods after the monsoons are over. The increased run off, especially after heavy downpours, comes in a sudden rush and often gets blocked in the silted streams. The water develops power enough to cause devastating floods. The effects catch the eye when erosion has wrought its destruction, but the initial processes began to work long before. This type of water erosion arising from destruction of forest and grass cover has been going on for ages. The forest cover or a cover of suitable vegetation, e.g. natural grasses, has to be recreated in these eroded regions and nature must be allowed to heal the wounds by setting in motion processes of soil formation and growth of regetation.

There are other types of water erosion tough not so spectacular in their effects recepting some form of river or bank eroon. The latter has been responsible for veeping away flourishing towns and llages. This sort of soil erosion may be minated by training the rivers so that may be utilized for drainage and ligation.

A much less slower form of water sion which is cumulative in its effects is therefore insidious, is that going on rently sloping lands and in the plains

all through the country. Cross cour railway journey bring home to us the tent of such erosion. Apart from par or total loss of soil, these gentler forms and soluble salts and their effects on ! of soil and its fertility can be very serio The tendency to erosion in cultivated la: and areas without adequate forest cov depends on agricultural practices, as a! on the soil, topography, the cover of v getation and distribution and intensity rainfall. These conditions vary according to locality, and control measures must b adopted to suit them. A good cover vegetation and suitable methods of somanagement aiming at a diminution of th velocity and volume of run off, such as bunding, terracing, contour cultivation strip cropping, tanks and ditches, drain age channels with a good grass cover, or of brick and cement or concrete, and preservation of soil structure, form the basis of measures for the control of water erosion.

Erosion also results from wind of wave action but much less information exists regarding their extent in Indipartly because they are not so extensive as the others. Sand dunes are known in several parts of the country. Dust stormin summer are common experiences. One can see from the hills, e.g. in Simla, thick palls of dust resembling clouds which hand in the air and stretch over considerable distances.

Conservation of soil fertility is another fundamental aspect of soil reclamation. Crops and plants extract their nutrients from the soil. And the losses thus caused together with those caused by erosion, by climatic factors and by leaching by water must be made good in order that its productivity can be raised to and maintained at its optimum. Different plants make different demands on the soil. The imme-

and reserve powers of different soils eet these demands vary. The soil has its natural powers of transformation recuperation regarding some aspects a fertility. These powers also show ations.

Plants growing in natural associations soil and climate ensure a balance veen depletion and recuperation. The l condition is often attained in virgin sts and in steppes or prairies. The er types of soils develop under suitable atic and geological conditions under iduous forests and perennial natural sses. Grasses and legumes conserve organic matter and nitrogen and ensoil both physically and chemically. fivated crops make a great demand on soil, thereby causing depletion of the ck of nutrients in the soil and deterioon of soil structure—the latter factor ders it more liable to erosion losses.

In temperate climates blessed with au n distribution of a moderate annual hfall, natural forces are favourable to maintenance of organic matter (hus) and nitrogen at a high level and of probial activity. These are inter-related. he manures, and fertilisers supply the eds of extractive farming. When soil pleting crops are used, rest and recutation from their depleting effects have be ensured also by suitable systems of ation which allow soil conserving crops act in turn with soil depleting ones. te peculiarities of Indian climatic conions-determined by a rainfall, often heavy downpours, concentrated within out four months; by a high mean temrature over the major part of the coun-; and by a relatively dry winter and a y summer both accompained by bright nshine, which follow the rainy season : most favourable to the destruction of janic matter and soil nitrogen, to leach-

ing by water, to deterioration of soil structure, to erosion, and to interruption of beneficial microbial activity. These peculiarities together with the failure of rains, especially a succession of such failures, excessive rainfall localised in short periods of time, floods, and insect pests constitute the most important limiting factors in our crop production. Every effort has therefore to be directed to find out and use all possible methods aiming at the control of erosion, the maintenance of optimum humus and nitrogen status of our soils, and also optimum moisture relationships. Cultivated crops are in general an unavoidable evil so far as conservation of soil is concerned. Continuous attempts have to be made to evolve better methods of rotation and soil management, including treatment with lime, manures and fertilisers so as to secure not only the optimum yields and quality of crops but also the conservation of soil fertility and soil structure.

CONCLUSION

In conclusion of this article it is not out of place to mention that better farming is quite possible in this country, but not without the levelling up of the cultivators general and special education in improvements and modernized methods. The increased production of essential crops cannot be brought about by the antiquated processes or without a transformation of the mentality and character of the cultivators by the inspiring influences of education. This is, therefore, the crux of our problem. The cultivators agricultural must be awakened to the realities and demands of the present situation. His efficiency cannot increase under the deadening weight of gross ignorance. The farming industry stands to suffer, while its units are wedded to old, obsolete notions and practices.

The raison d'etre of the Agricultural Department is to bring the message of new developments to the doors of the agriculturists. But in this the Department has failed to justify itself. The distribution of stray packets of seeds or the display of novel implements and processes at exhibitions does not mean that a link of sympathy has been forged by the Department with the peasants. It is to be regretted that the distance between the two has not been to any practical purpose abridged. An officer of the department will not be worth his salt if he conducts himself in such a manner as not to be regarded by the cultivators as their guide and friend. There must be a spirit of comradeship between the two. And this cannot be an accomplished fact unless the officer thoroughly enters into the feeling of the ryot and carries on his work with the saving grace of sympathy. It is of the

officer should be well acquainted not of with the special conditions of Indian and agriculture but also with the psychology of the peasant's mind.

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-PHARMACEUTICAL RECIPES

TOOTH CAVITY PILLING

inc Oxide	4	đr.
Thymol Iodide	5	gr.
Creosote Oil	10	drops.
Clove Oil	12	72
Lanolin, enough to make a so	lid pas	ite.
Mix	_	

EYE ANTISEPTIC CINTMENT

	·
Sulphanilamide	10 parts.
Sulphathiazole	10 ,,
Proflavin	0.025 part.
Distilled water	5 parts.
Anhydrous lanolin, enough to make	100 ,,
Mix	

CHEST RUB SALVE

Petrolatum	1 lb,
Hard Paraffin	1 oz.
Eucalyptus Oil	2 fl. oz.
Menthol	4 dr.
Cassia Oil	1 ,,
Spirit Turpentine	4 ,,

Melt the petrolatum and paraffin wax pgether in a double boiler and then add the kenthol. Remove from the heat, stir, and cool little; stir in the oils, add turpentine and the benthol. When it begins to thicken pour into ins and cover.

STRUP OF FERROUS PHOSPHATE WITH QUININE & STRYCHNINE (I.P.L.)

Iron filings Phosphoric acid	8.6 35	grams.
Dissolution in a description of the		cc.
Strychnine hydrochloride	0.3	grams.
Quinine hydrochloride	13.3	"
Dilute hydrochloric acid	50.5	c.c.
Simple syrup	660.0	b
Glycerin	140	•
	TAA	**
Distilled water, sufficient		
to produce	1000	

Dilute the phosphoric acid with 70 c.c. of istilled water; add it to the iron filings in a lask of suitable size, and heat on a waterbath intil the filings are dissolved; add to this a solution of strychnine hydrochloride and quinine ydrochloride in the 50 c.c. of dilute hydrochloric acid; filter it into the syrup and lycerin previously mixed and pass sufficient istilled water to produce the required volume.

4-80-40 PRODUTIVE

Kaldana, powdered
Rock Salt
Dried Ginger (Sonth)
Mix. Dose: 1 dram with mil
Voz. XLII. No. 493

PILES WITH CONSTIPATION

LIMPO ALTY COMPANY	
Chebulic myrobalans	1 dr.
Beleric myrobalana	1
Embelic myrobalans	1
Aniseed (Sonf)	1
Ginger (South)	1, ,,
Senna leaves (Salsa)	1 m
Black sait Pulverize and mix.	4 10
Dose:—1 dr. in hot milk at bed	time.

BRONCHITIS PILLS

Cinnamon	60	grains.
Aniseed	60	
Liquorice	60	
Raisins, without stones	180	99
Sweet almonds	60	89
Bitter almonds	60	80
Sugar, refined	60	20

Powder all drugs well and make into a pill mass with little water. Then make pills of 5 grains each.

LIQUID EXTRACT OF BAEL

Bael, bruised	1000	grams,
Chloroform water	15000	c,c,
Alcohol, (90 p.c.) sufficient to produce	1000	**

Macerate the bruised bael for 12 hours in 5000 c.c. of chloroform water; pour off and reserve the clear liquid; repeat the maceration a second and a third time for 4 hours in each rase, using for each maceration 5000 c.c. of the chloroform water and strain the mixed liquids. Evaporate to 750 .c.c.; cool; add sufficient alcohol (90 p.c.) to produce the required volume. Set aside for 48 hours and filter.

Dose: -60 to 120 minims.

LIQUID EXTRAOT OF JAMBUL

Jambul stone, ir	COATSS		
powder	•	3000	grams.
Alcohol		2000	0.0.
Water		1000	_

Mix 1800 c.c. of alcohol with 900 c.c. of water, and having moistened the powder with with 1050 c.c. of the mixture pack it firmly in a cylindrical percolator, then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed, gradually adding menstruum, using the same proportions of alcohol and water as before until the jambul is exhausted. Reserve the first 2550 c.c. of water.

Distil of the alcohol from the remainder by, means of a waterbath, and evaporate the residue to a soft extract, dissolve this in the reserve portion, and add enough menstruum to make the

fluid extract measure 8000 c.c.

-Recipes for Small Manufactu

DOMPACT NOVGE

Carmine No. 40 powder	5	parts.
Armenian bole	35	
Maize starch	180	
Precipitated chalk	220	60
Talc	600	67
Perfume compound	10	De

Mix and sift through 200 mesh sieve. Triturate with about 25 per cent, of excipient which is made by dissolving dextrin or sugar in a small amount of water the mixture is finally compressed into tablet form.

IMITATION GOLD

Copper	90	parts.
Gold	21	11
Aluminium	71	**

Melt the copper and the gold in a crucible composed of refractory material or if a mixture of unburnt fire-clay and dust of fire bricks, glass pots or seggars, and when the metals are fluid the aluminum is added. When not more than 2 lbs. of the alloy are made at one time the mass is kept in a fused state for half an hour, about 41 of. of borax being added as a flux. The melted mass is then poured into ingots.

This alloy is used for making cheap imitation gold ware, resembling gold in colour and not tarnishing in the air.

SILVER PLATING POWDER

This is intended for use on brase and copper articles.

Chloride of silver	1 ounce.	
Pearlash	3 ounces.	
Common salt	11 ,,	
Whiting	1 ounce.	

These ingredients should be in as fine a powder as possible to reduce them and thoroughly mixed together.

The article to be silvered should be thoroughly cleaned and wiped dry. Then with a soft piece of leather, that has been dampened in water and dipped in the powder thoroughly rub the article to be plated so that every section receives an even coat. It should then be washed well in hot water and wiped dry.

CASHEWNUT TOFFEE

Take 2 lbs. sugar and 150 cashewnuts; skin the latter like almonds, in hot water, and chop up with a knife or mincing machine. Make a syrup of sugar with 2 tumblerfuls of water, then add nuts and cook till the whole crystalises; put into a filtered plate and when partly cut into squares or diamond shapes.

STAINLESS STEEL SOLDERING FI

(A)	Boric acid	5	pa
	Potassium fluoride	5	
(B)	Hydrochloric acid	5	Dai
	Distilled water	5	,

Make a thin paste of (A) and (B) and to the joint.

DOG SHAMPOO

Soft Soap	8	part
Glycerin	21	
Alcohol	2	12
Phenol	ŧ	part
Eucalyptus oil	Ĭ	
Water to make	35	parts
		_

Dissolve the soft soap in the water by wing. Then cool and mix the other ingredic

ANTI-PYORREEA TOOTH POWDER

Calcium Glycerophosphate	2	parts
Common sait (sodium		_
chloride)	2	59
Animal charcoal	1	part

Grind each separately into fine powder mix.

ADRESIVE FOR CELLOPHANE

Gum arabic	16.5	parts
Glycerin	29.5	
Water	49.5	19
Formaldehyde	4.5	

Dissolve the gum arabic in the water at mix the glycerin. Lastly add the formaldehy, and bottle.

BOILER COMPOUND

Soda ash	87 parts.
Trisodium phosphate	10
Starch	1 part.
Tannic acid	2 parts.
Use powdered materials,	mix well and the

MOSQUITO REPELLING OIL

pass through a fine sieve.

Cedar oil	2	fi.	0%.
Citronella oil	4	fl.	02.
Spirits of Camphor	8	Ħ.	OZ.

Mix in a dry bottle, and the oil is ready for use. This preparation may be smeared on the skin as often as is necessary to repel mosquito and other insects.

-IN THE FIELD OF INVENTION

ENT PAPER PARACHUTE

A new, improved paper parachute is claimed we many uses and to stand up under storage itions. According to a recent patent, paper he parachute is treated with 1 to 4½ parts yeerine in 100 parts of commercial alcohol. In the paper has been thoroughly saturated, as solution is removed and the alcohol is orated from the paper. Paper treated this reportedly may be folded and tightly packed torage without damage to it or cracking at tolds.

Lization of oil mill refinery wastes

The recovery of lecithing which are now g increasingly used in food technology is hasized. Lecithins can be recovered from mucilaginous matter mainly by centrifugafter floculation and removal of aqueous r-and may be subsequently further treated a accione for removal of glycerides, fatty s and possible impurities. Carotenoids, uring matters in the oils and fats are geney climinated in the process and bleaching recovery is not possible except in palm oil. red paim oil (which is the name given to id fraction obtained on neutralizing palm represents about one-third of the original and contains unsaturated glycerides and it of the colouring matter. The recovery of otene from this fraction involves the prepaon of methyl esters and subsequent (a) disng under high vacuum (1/10 mm, Hg) at a perature of 130°-140°C, and recovering the ptenoids by chromatography or (b) saponig at a temperature of 60°C, or below in a ogen atmosphere and treating the resultdry soap mass with petroleum ether, aceor a chlorinated solvent. The latter (b) is improved method and limits the saponificato the coloured liquid part of the oil so t there is economy both of solvent and appaus. The soap forms a useful byproduct— ium oleate—with 25-30 per cent. palmitate. s carotene extracts should prove valuable in mai nutrition. They are odourless and tasteand sufficiently stable as they retain all the ural atioxidants of palm oil.

Sterols which form the greater part of the aponifiables of oils are a valuable source of hormones, vitamin D and other pharmaceul products. The sterol content varies widefrom 0.3-0.4 per cent. in linseed or coles oils 3.5 per cent. in cotton seed oil, and over 7 cent. in some fish liver oils. The odorous stances in oils and fats removed in the superted steam treatment have a fairly high one content, e.g. methylmonylketone. These stances may be of value in perfumery.

-CHINICAL ÂM.

NEW-RESIN-SAND MOULDING PROCESS

A new resin-sand process for making foundry moulds and cores, described as "Croning", "C", or "Shell" process, developed in Germany during the war is now being tried on a pilot-plant scale in U.S.A. (C.T.J., 1950, 127, 1012). The process promises large savings and improvements over conventional sand moulding of cast iron and other metals and may become one of the biggest single uses for resins.

of the biggest single uses for resins.

A mixture of 100 parts of dry sand and 8 parts of a thermosetting phenolic resin binder is placed on the hot metal pattern previously treated with a silicone resin as in greasing s cake pan. The pattern is built up to a thickness of i"-1", the excess resin-sand mixture is shaken off and used again. The pattern covered with a thin layer of the resin-sand mixture. about 3/16" thick, is heated in an oven for 1-5 min. until the resin is set, forming a thin shell over the pattern: the shell is then removed from the pattern. Cores to fill hollow spaces in the final products are made by blowing the resinsand mixture with compressed air into a splitheated metal core box. The mould is embedded in a box of steel shot where it can receive the molten metal. The mould/surfaces are smooth and require little surface cleaning.

Sections as thin as 0.01" can be poured and tolerances of 0.002"—0.008", for small castings can be achieved with the process. Castings up to 100 lbs, have been produced. The method may prove very useful for mass production of identical and relatively small castings for automobiles, tractors and farm machinery. The volume of sand necessary for making moulds can be reduced by 90 per cent.: machining and cleaning costs are cut by 80 per cent.: improved working conditions result from the relative freedom from excessive dust and heat; more efficient handling of materials and better use of foundry floor space are claimed. Hardened moulds can be made ahead of time and stored until needed.

-JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

IDENTIFICATION OF CLAYS

A simple, rapid colour test for a qualitative estimation of clay composition in soils and rocks, and staining techniques that help to distinguish between clays that are harmful and those that are beneficial in agriculture and in construction work, have been developed at the U. S. Bureau of Reclamation, Denver,

The specimens for staining are extracted with a strong solution of hydrochloric acid and after heating and dry distillation the material is filtered and stained with saffranine. The stained specimens are examined under a microscope and the composition of the soft can be quickly determined by matching it with a comparison chart. Rapid field tests can be made by adding benedine directly to untreated soils and rocks. Colour changes are charved within 5 mis.

-- JOHNMAN OF SCHIFFING & INDUSTRIAL PROPERTY.

-FORMULAS, PROCESSES & ANSWE

ZINC OINTMENT

3126 P.G.S., Juliundur City—Wants to have a formula of zinc ointment.

Zinc oxide 1 oz.

Benzoated lard 6 ...

Mix in a mortar by rubbing and put in pots.

CREAM OF TARTAR

To prepare cream of tartar take crude tartar or argol deposited on the sides of the tasks and vats during the fermentation of grape juice. Now dissolve the argol in hot water and treat it with a little pipeclay and animal charcoal, to remove the colouring matter derived from the wine. Filter the solution and set aside to crystallise.

MILK TOFFEE

Sweetened con	densed milk	3 ths.
Full cream m	ilk	1 quart.
Sugar	1	31 tos.
Glucose		4
Butter		4 fb.
Vanilla and sa	it to flavour-	-sufficient

Cook to crack all the ingredients together in an earthenware vessel of enamel except the last two. Then add the butter and vanilla essence. Pour the hot mass over a buttered marble slab. Lastly cut in cubes of required size and wrap in wax or cellophane paper.

HAIR PIXATIVE

3136 S.W., Madras—Wishes to have a good recipe of hair fixative,

(a)	Distilled water	700	parts.
	Glycerin	30	
	Borax, powdered	25	39
(b)	Tincture of benzoin	225	9.0
(c)	Perfume	10	

Make a solution (a), and add (b) with good stirring and a thin jet, add (c). Allow to stand for 3 to 5 days. Filter and bottle,

REFINING PARAFFIN WAX

To refine paraffin wax melt it over slow fire and digest it with 1/10 of its weight of animal charcoal in a liquid state. When the purification is complete, the paraffin is strained through linen and crystallised.

CEMENT POR GLASS

\$143 G.R.G., Kothapur—Wants to have a formula of preparing cement for glass.

	-	-	
Isinglass		1	0%
Powdered giue		1	đr.
Distilled water		2	OE.
Salicylic acid		10	RT.

Put the isingless and give in a gallipot add the salicylic acid and the water, pressing down the isingless with a pestle until it is all scaked. Place gallipot in a saucepan of water, brighthe boil, stirring until dissolved, then a ld Acetic acid (38 per cent.) 1 - cz. Mix well, and pour into bottles.

SULPHATE OF AMMONIA

and coke in equal proportions.

3151 M.B.L.S., Kanpur—Desires to knoprocess of manufacturing sulphate of amnufacture of ammonium sulphate ammoniacal liquor obtained in the facture of coal gas is heated whereby the amnufacture of coal gas is heated whereby the above passing through a heated mixture of gype

By this means the gypsum is converted in calcium carbonate and ammonia into ammonia sulphate. The latter being soluble in water separated out from the insoluble calcium each nate by treating with water. The solution next evaporated to dryness so as to obtain solution ammonium sulphate.

MIRROR MAKING

3156 O.P., Delhi-Desires to learn a methof making mirror.

In making mirror two solutions are requed namely reducing solution and silvering solution:—

Reducing Solution—In 1 oz. of distribution dissolve 12 gr. of Rochelle salts, and by while boiling add 16 gr. of silver nitrate d solved in 1 oz. of distilled water and combolling for 10 minutes more; then add 1 a distilled water to make 12 oz.

Silvering Solution—Dissolve 1 oz. of silvering Solution—Dissolve 1 oz. of silverinte in 10 oz. of distilled water, then a liquid ammonia until the brown precipitate nearly, but not quite, all dissolved, then add oz. of alcohol and sufficient water to make 1.1

To silver: Take equal parts of the insolutions and mix thoroughly, and lay the plantage down, on top of the mixture while wet all it has been carefully cleaned with soda and instruments washed with clean water. About 2 dr. of the will silver a plate 2 inches square. The clim which the silvering is done should be only little larger than the plate. The solution show at and and settle for 2 or 3 days before being used and will keep good for a long time.

MASSAGE CREAM

White wax	4	ounces.
Spermaceti	4	to
White petrolatum	12	
Rose water	14	
Borax	80	grains.

Melt the wax, spermaceti, and petrolatu together over a water bath; dissolve the born in the rose water and add to the melted mass one time. Agitate violently. Presumably if ax solution should be of the same temperae as the melted mass,

INEGAR FROM COCONUT JUICE

Take a measured quantity of coconut juice a suitable vessel. Add to it one thousandth art of its volume of honey. Place on the surace traces of acetic acid ferment: leave the hole exposed to the air in a normal temperature. The action now goes on regularly for 4 weeks or more, and sometimes later.

Make a separate powder to be mixed with he above:—

Alum 3 lbs.
Neutral tartrate of potassium 5 oz.
Chloride of ammonium 7 lbs.

About 20 grains of this powder have to be lissolved first with a little soft water and then nixed to each gallon of vinegar and filtered.

OAP POWDER

3156 O.P., Delhi—Wishes to have a process

f making soap powder.

Soap powder is simply soda ash and soap coled, and ground to a powder. Sodium siliate is also used as an ingredient. In preparing the soap a little more water should be added han is used in finishing settled soap. Should be soap be finished too coarse the mixture of oap and soda-ash in the crutcher may be too nick for easy working.

Mixing and Framing: For this purpose 10 soap crutcher may be used, but it is desirble that for making the thick, heavy mass of pap and ash the mixer be more strongly built ian the ordinary soap crutcher and preferably the type with either horizontal or vertical. lade agitator. The ingredients added to the fixer comprise thin soap, soda-ash and silicate soda. These may be in various proportions ecording to the quality of powder desired. For single frame 600 to 700 pounds each of soap, id ash may be used to which 100 to 125 pounds ' silicate are added. Soap is run in first, the mount being determined by the level in the ixer, and then the ash in successive amounts itil the entire weight is added. Addition of itire amount of ash at once may block the crutier and bend or break the blades of the mixer. ne amount of silicate added will depend upon e consistency of the mixture of soap and ash. the soap is finished too thin, the weight of h may not be sufficient to counteract the thinas of the resulting mixture, in which event ther more ash or less silicate may be added. hen a homogeneous mixture has been obtain-

ed the mass is framed. One day as a rule suffices for cooling, at the end of which time the mass is stripped and cut. Corners and ends of the frame are usually hard, to penetrate while the ordinary soap-slabber is unsatisfactory. Recourse is to be had to be cut by wire, it must be disintegrated by more laborious means. After slabbing is the most cleanly and convenient. According to the floor method, the mixed soap and soda-ash are run directly from the crutcher, used exclusively for this purpose. on to the floor of the apartment, where it is allowed to solidify. After this it is broken into coarse lumps to facilitate cooling and drying. The mass is then further disintegrated, and ground as required. The slabs after disintegration, either by hand or disintegrator, are ready for grinding.

GLUCOSE

3176 P.K.K., Navsari—Desires to know the process of manufacturing glucose.

Liquid Glucose or Starch Syrap: To pre-pare it moist potato-starch, carefully purified from nitrogenous matter is employed, 200 parts by weight of water and as much sulphuric acid as serves to make a 0.3 per cent. solution are placed in a leadlined vessel, and 100 parts by weight of starch (weight dry) made into a milk with water are run into the boiling acid, so that the starch is almost immediately gelutinised. The mixture is then heated in a copper autoclave for one hour under 1 atmosphere pressure, so that about half of the starch is hydrolysed to dextrin and the rest to dextrose (or maltose). The process is finished when a portion gives no coloration with iodine-showing that all the starch has disappeared. The product is a non-crystallisable syrup having a density of 17°Be. The sulphuric acid is neutralised with calcium carbonate, the solution filtered from the calcium sulphate, through a filter— press, evaporated to 32°Be in a vacuum pan, again filtered from precipitated calcium sulphate, through a filter press, and finally decolourised by filtering through animal charcoal, which simultaneously absorbs some of the finer particles of calcium sulphate. The syrup is now again concentrated in vacuum pans to 40°-45°-Be and should be clear and colourless.

Solid Glucose: Solid glucose is manufactured in the same way as the syrup, but the hydrolysis in the autoclave is carried on for a longer time so that the resulting mixture contains almost twice as much dextrose as dextrin. The product, when filtered, decolorised and evaporated, solidifies as a white mass of

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THE SHAPE STATE OF THE STATE OF THE SHAPE OF

microscopic crystals, in which fine needles of dextrose hydrate may be seen embedded in syrup. The crystalline dextrose hydrate how-sver, be separated by ordinary means from the syrup.

ETCHING ON STEEL

3192 S.B., Moradabad—Wants to have a process of etching steel.

Dissolve in 150 parts of vinegar sulphate of copper, 80 parts; alum 8 parts; kitchen salt, 11 parts. Add a few drops of nifric acid. According to whether this liquid is allowed to act a longer or shorter time, the steel may be engraved upon deeply or the surface may be given a very ornamental, frosted appearance.

BRASSING IRON OR STEEL ARTICLES

\$203 K.L.D., Bombay—Wishes to have a simple process of brassing iron articles.

Acctate of copper, 100 parts, by weight; cyanide of potassium, 250 parts; bisulphite of soda, 200 parts; liquid ammonia 100 parts; protochioride of zinc, 80 parts; distilled water, 10,000 parts. Dissolve the cyanide of potassium and the bisulphite of soda. On the other hand, dissolve the ammonia in three-fourthy of the water and the protochioride of zinc in the remaining water; next, mix the two solutions. This bath is excellent for brassing zinc and is used cold.

BRONZE POWDER

These are made in various ways:-

1. The alloy is laminated into very fine leaves with careful annealing, and these are levigated into impalpable powders along with a film of fine oil to prevent exidation, and to favour the levigation.

2. The scraps, cuttings and fragments of Dutch leaf are the materials for the German bronze powders. First brushed through a sieve and ground with gum water on marble slabs for six hours, the gum washed out, the powders sorted, dried, and a coating of grease given to make them appear more brilliant, and to protect them from oxidation.

5. Brandi's Patent Proces:—In making bronze powders they first take precipitated copper. It is allowed with zine, cast into ingois rolled into ribands, cut, annealed, and rolled the metal in thin and leaf-like Then it is taken to a steam-mill and ground. The bronze powder is washed out and dried, then introduced into an air-tight room, with an arrang-ment of boxes; the air in the chamber is set in violent motion by bellows, and the powder diffused

throughout; the bronze powders are deposis the finest in the upper boxes and the conpowders below.

1

ARTIFICIAL STEEL SLATES

3204 R.B., Lahore—Desires to know process of making artificial school slates.

The artificial slate coating on iron or st consists of a mixture of finely ground sir lampblack, and a water-glass solution of eqparts of carbonate of potash and soda silica The process is as follows:—

First prepare the silicate solution by fin crushing equal parts of carbonate of potash n soda silicate and pouring over this 6 to 8 tin the quantity of soft water, which is kept boil about 14 hours whereby the silicate is complet dissolved. Add 7 parts finely crushed sl finely ground with a little water into impalpa dust, 1 part lampblack, which is ground with and grind enough of this mass with the previously prepared silicate solution. With the compound the rough form of steel plates a painted as uniformly as possible. Keep as the painted plates for a week, Then put it a saturated solution of calcium chloride a wash with clear water.

RADIATOR COMPOUND

3231 K.S.N., Bangalore—Wishes to he formulas of radiator compound.

A 20 per cent solution of sodium silicate mixed with zinc dust and whiting (§ zinc dust whiting). This will take about 6 hours to s

Moreover, to stop small leaks quickly the white of 2 eggs in the radiator while t water is cold. Another recipe of quick seal i radiator is as follows:—

Cellulose lacquer, colourless 10 parts
Aluminium filings 3

COMPOUND SHELLAC

60 per cent zinc-hardened Vinsol and 40 r cent dry orange sheliac by weight. The Vini is melted to 450°F, and 3 per cent of zinc oxi on the weight of the Vinsol is sifted in and t temperature gradually raised to 575°F, th cooled to 400°F, at which point the shellac added and when thoroughly blended the mix poured into cooling pans. A 4-pound cut of the blend behaves very much as pure sheliac in t majority of tests.

BLACK INSULATING TAPE

Resin 20 parts.
Resin oil 20 ...
Coal tar 20 ...

MANUFACTURE OF RUBBER GOODS

A treatise exposing in a simple style the manipulation of raw rubber in the manufacture of various rubber goods and giving detailed processes of their Manufacture.

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THE PROPERTY OF THE PROPERTY OF THE PARTY OF

APRIL 1951

Wood tar 10 parts.
Kerosene off 10 ...
Idnseed off 10 ...

Mix the ingredients over a moderate fire treat the tape with the composition.

RACTION OF PEPPERMINT OIL

3233 K.K.S., Guntur-Wishes to have a ass of extraction of peppermint oil.

Peppermint oil is obtained by distillation the fresh and sometimes partially dried, ring tops of different species of the Genus ha. The distilling apparatus consists of a len vat containing the herb, placed on an pan containing the water. Fire is applied, the steam passes through the herb and is ensed on an inverted cones. The distillate rried away to the receiver by a tube through side of the vat.

ARIC ACID

3256 K.D.S., Jaipur—Desires to learn a ass of manufacturing stearic acid and also nony trichloride.

stearic acid can be prepared by Milly's clave Process. In this process the saponifin of fat is carried out by lime in presence ater in strong closed metallic vessels, at a crature of 172°C. One form of such vessels he saponification by lime under pressure has been much used is an egg-shaped der. The lime soap after its separation is prosed by sulphuric acid, four parts of acid ich three parts of lime used being taken. Complete subsidence of the calcium sulter the free fatty acids are thoroughly washed water and steam. The crude fatty acids ext melted and run into dishes or trougher of tin. These are placed in at room crature for 2 to 3 days to cool or until mts have granulated. The cakes are then a canvas bags and pressed to remove the

After this the thin cakes of stearic acid is ned. This is known as single pressed ic, acid.

IMONY TRICHLORIDE

This salt may be prepared in the dry way issing chlorine over excess of antimony, or eating together antimonious sulphate and m chloride, when sodium sulphate remains intimonious chloride distils over. The salt also be obtained by dissolving either antior antimonious sulphide in strong hydroic acid, and distilling the rest.

! POLISH

259 A., Bombay-Wants a good recipe of polish. heliac war lbs. lees war 1 1b. lard paraffin 2 lbe. oft soap 1b. urpentine oil 24 gallons)il soluble dye OS.

Melt the wax over slow fire in capacious iron pan. Next add the soap and heat to dissolve, Then slowly stir in the turpentine oil and lastly dye dissolved in a little turpentine oil; when thoroughly mixed extinguish the fire but go on stirring until the mixture begins to thicken. At this stage pour in tins.

NAPHTHALENE BALLS

In order to produce napthalene balls the purified naphthalene is carefully melted at a low heat in an ordinary melting pot and ladled into the moulds with an iron ladle. Great care must be taken in melting the substance because at a high temperature it will ignite and burn causing a great loss to manufacturers. In casting, iron and wooden moulds are generally used. These are made in two halves connected together with pins; in each half a number of hemispherical depression are sunk in a line with a tube connecting them all together. At one end of the mould in a hole drilled for pouring in the melted mass. On cooling the liquid is solidified into bails, which may be separated by braking off the attached pipe.

LUBRICATING GREASE

3285 D.N., Delhi—Wants to have good formula of lubricating grease and also erasing rubber.

Petroleum jelly	120	parts.
Ceresine wax	6	29
Slaked lime	1	part.
Water	44	parts.

Heat the wax and the petroleum jelly until liquid; then mix together the water and lime. Decant the former into packing receptacles, and add lime water, stirring until it sets. For cheaper qualities use cream cylinder oil instead of petroleum jelly.

CHALK CRATONS

3291 S.H.R., Goregaon-Wishes to have recipes of chalk crayons,

Precipitated chalk 40 parts.
Plaster of Paris 45
Lithopone 10
Glue solution 5.10

Knead all together to make a soft dough and pour into gun metal moulds. When set take out and allow to dry in air. Then put all together in a tray and moderately bake over mild fire.

TRADE MARKS & PATENTS
For any difficulty in registration of trade
marks & patents in India or abroad Consult;
DEWAN RAJKUMAR,
Trade Marks & Patents Attorney,
76, Podar Chambers, Fort, Bombey.
Phone: 32444. Note: Head office of Trade

Marks Registry for India is in Bo

-READER'S BUSINESS PROBLEM

[Reader's business problems will be discussed in these pages. We invite the reader to we us his difficulties. As the department is in charge of an experienced businessman who specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful problems. These replies will be published in the paper only and cannot be communicated post.]

OPENINGS FOR EDUCATED INDIAN LADIES

235 R.L.D., Chinsurah writes—A girl of mine has passed the l.A. I am unable to provide for her further studies. The same reason operates strongly against her marriage as obviously I cannot give her away in marriage to one who is below her from an educational view point, and I have not the money necessary for her marriage with a bridegroom of high educational attainments. Though I am a Hindu, I do not observe the purdah. Can you tell me what arrangements I am to make for her future career?

Answer:-This is a very complex question, the solution whereof involves issues of social and economic nature. At any rate, we are glad that you have told us that, "although a Hindu, you do not observe the purdah." This has made matters somewhat easy for us. We fully appreciate and respect your unwillingness to marry your daughter to one who is below her from an educational viewpoint. It would no doubt have been eminently desirable if you could have managed to get her graduated. But if, as you have said, the financial difficulties, of which you are the best judge, be really insuperable, then we are afraid there is no help in the matter. Why not ask your daughter to join one of the Insurance Companies as a canvasser? The prospects are ample, and a smart and educated lady, after some preliminary training as is usually imparted to their canvassers by at least some of the Insurance Companies, is sure to make a good income by her activities. Competition is almost unknown, as unlike males the number of ladies who have hitherto joined this line, is exceedingly limited. The work, besides, is not likely to be very hard in nature. Anyway, we feel sure that the Insurance Companies will only be very glad to respond to your queries if you enquire of them on your daughter's behalf as to whether or not there

is any prospect for her if she chooses to sta as a canvasser of Insurance Policies.

POLICY FOR NEWCOMERS IN TRADE

3106 M.V.N., Madras—I have started general store here very recently. Some of m customers request me to sell goods on creb. But as I have a very small capital, I cannot supply goods on credit. I shall be his obliged if you please advise me on this.

Considered from all points of view fo one newly initiated in trade the best maxim to be followed would be to transact on a cast basis. As he gets back money as soon as the goods are sold and the capital invested is conparatively small, he can afford to make he profit and this can offer cheaper rates to \. constituents. Moreover, as he receives so 1. is easily able to pay cash and thus secure good discount from the house whence he make his purchases and this compensates for the easy terms he quotes to his customers. That point is often not clearly understood by or traders. Many are found to buy on credit and if they have cash in hand or suitable reservin banks. It often pays to borrow from a bank to avail oneself of the discount he can enter by making ready payments. Suppose that the monthly purchase is Rs. 1000 and the discent available is 21 per cent, then if he pays rend cash he will get Rs. 25 as discount. Consider ing that he borrows at 12 p. c. interest a 123. far too higher than at which it is available he has to pay Rs. 10 monthly and thus makes a clear profit or Rs. 15 per month will no exertion but only with a little finarcis calculation. Another important alvantage scores over his competitor working credit system is that he has not to pay it additional staff required for keeping accounts of the customers and taking recommendation to litigation against the customers when the fail to pay their dues.

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There is a wide field in India for the manufacture of milk products like ghee, butter, casein, evaported milk, etc. Complete information on manufacturing all sorts of milk products including malted milk and milk sugar is given in the treatise, With 12 Illustrations, Rs. 3/-, Postage Extra.

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-BRIEF QUERIES AND REPLIES

tions of any kind within the scope of Industry are invited. Enquiries or replies from our rts will be published free of charge in serial order. Questions are replied by post on receipt ls. 8 stamps for each question. Subscribers outside India are requested to send two Inational Reply Coupons for each question. In order to facilitate the work of Editor's Departt and to help prompt action the readers are requested to send enquiries in separate letters.

1 S.N.M., Kanpur-We have no book on colour manufacture. An article on lead me manufacture appeared in February 1951

e of Industry.

2 B.C., Comilla—For chemicals and dyes are of Imperial Chemical Industries port) Ltd., Sardar Ghat Road, Chittagong. 3 S.R.A., Jharwasa—Following is a list of eral dealers: All-India Minerals Association, Vetaji Subhas Road; Bagri Mining Syndicate, Cross Road; Bengal Supply Co., 23, Strand d; Calcutta Mineral Supply Co. Ltd., 31, son Lane; East India Trading Co., 2, Church and Free India Agencies, 1-2, Jackson e; all of Calcutta,

N.C.I., Baroda-A formula of tambul r appeared in January 1951 issue and a iula of Mukhbilas appeared in February 1951 of Industry. You may also consult Home stries published from this office, price

T.K.S.R., Pondicherry--You may consult ber 1950 issue of Industry which may be to you on receipt of As. -/12/- postage stamp. not possible to remove upper coating of

6 S.P.S., Chikati—The bluing of gun barrels fected by heating evenly in a muffle furnace the desired blue colour is raised, the barrel g first made clean and bright with emery b, having no marks of grease or dirt upon metal when the bluing takes place, and then r to cool in the air. It requires considerable rience to obtain an ever clear blue.

J.S.K., Delhi -You perhaps mean table which may be prepared as follows: To make salt dissolve lump rock salt in four times reight of water, filter and then drop into the red solution first chloride of barium and wards carbonate of soda as long as any ipitate falls. Then filter and evaporate the fluid very slowly until crystals begin to ar. When this condition has been reached aside the solution for a day. The crystals aken out, dried and kept in bottles.

R.C.C., Patna-Following is a recipe of table cod liver oil: Cod liver oil is extracted 90 per cent alcohol, filtered and the alcohol

distilled off. Citric or tartaric acid 10 gr.; lemon oil 15 min.; syrup 4 oz.; codliver oil 4 oz.

9 P.V.R., Tanuku-For vermicelli and sago making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

- 10 R.M.D., Bombay-For hosiery write to Ahmedabad Hoslery Factory, Ahmedabad; Fine Knitting Co. Ltd., Railwaypura, Ahmedabad; Karnatak Hosiery Works, Shahapur, Belgaum; Mehta Hosiery Works, Kachria Pole, Richey Road, Ahmedabad and Southern Knitting Works Ltd., Poona. Following is a list of hinge manufacturers: Abdul Kader Shamsuddin & Co., 41, Khoka Bazar, Bombay; Bombay Hinge Supplying Co., 66, Musjid Bunder Road, Matunga, Bombay; New India Hinge Supplying Co., 215-217, Samuel Street, Bombay and Purushottam Ramji Ltd., 12, Raja Woodmunt Street, Calcutta. Following is a list of nut and bolt manufacturers: Bolt Nut House, 71A, Netaji Subhas Road, Calcutta; Baroda Bolt & Engineering Co., Gaya Gate, Baroda; Ambica Bolt Nut Works, 100, Foras Road, Near Municipal Workshop, Bombay and Bharat Nut Bolts Industries Works, Udyognagar, Opp. King's Circle Station, Bombay 22.
- 11 M.S., Tadeppalligudem-We have no book on coal industry. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co. Ltd., 3 & 4, Old Court House Street, Calcutta.
- 12 M.R., Ramur---Process of manufacturing camphor tablets appeared in January 1951 issue of Industry.
- 13 M.R.W., Bombay-Process of manufacturing rubber balloons of required description will appear in due course.
- 14 G.P., Berhampur—Technique of printing business will be found in Printers Guide published by Oriental Printing Works, 18, Brindsban Basak Street, Calcutta
- 15 G.M., Secunderabad-Following is a list of screw manufacturers: National Screw & Wire Products Factory, Belur, Howrah; British Screw & Bolt Works, 33, Narsingh Dutt Road, Howrah; Alliance Engineering Works. Santragachi,

A HELPFUL BOOK OF REFERENCE ON MODERN METHODS

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16 A.N.P.C., Coimbatore—For selling sarees you should advertise in local papers.
17 B.N.O., Rajkot - Refer your query to the

International Institute, Aligarh.

18 K.V.S., Bangalore For cleaning brass wire to a brilliant colour make a mixture of I part of common nitric acid and ! part of sulphuric acid in a stone jar, having also ready a part of fresh water and a box of sawdust The articles to be treated are dipped into the acid then removed into the water, and finally rubbed with sawdust. This inneediately changes them to a brilliant colour.

19 M.Y.K., Muzaffarnagar -You may take up agency business of foreign goods. But without any experience you will not be able to prosper in the line. It will be advisable for you to be an apprentice in a business house doing foreign agency business.

35 M.Z.Q., Etawah You should use maynesium oxide and ethyl ether.

36 P.C.I., Travancore For rubber you way enquire of the following firms: Periyar Rubber Co. Ltd., Thattakaad, Alwaye, Travancore, Portland Rubber Estates Ltd., Makut, Coorg; P. T. Thomas, Mundakayam, Travancore and P. V. Kuravilla & Sons, Kothamangalam, Travancore.

37 G.T.C., Jaipur - No machine is available for splitting bamboo into thin sticks. You have to cut into thin sticks with sharp knife

38 G.T.C., Nigeria It is not possible to supply all the addresses you require. All the addresses will be found in Industry Year Book and Directory price Rs. 16/4/-.

39 R.R.I., Tanjore We have no book dealing with forest product and indigenous herbs and drugs. You better enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

40 C.J., Calcutta--Following is a list of pencil manufacturers: Bhupati Pencil Factory, Post Box No. 52, Quilon, Travancore; F. N. Gooptu & Co., 12, Belliaghata Road, Calcutta; G. C. Law & Co., 2, Cornwallis Street, Calcutta; Hindusthan Pencil Ltd., 428, Kalbadevi Road, Bombay; Quilon Pencil Factory, Quilon; Star of India Pencil Factory, Washermanpet, Madras and Victory Pencil Co., Beach Road, Quilon, Process of manufacturing pencil will be found in Industry Prize Articles Vol. 1 published from this office, price Re. 1-14-0 including postage. There is no arrangement for giving practical training on pencil manufacture. You may start a pencil factory with Rs. 25,000 as initial capital.

41 B.S., Shillong—Refer your query regarding lac to the Director, Lac Research Institute,

Nankum, Ranchi.

STANDARD CHEMICAL & PHARMACEUTICAL WORKS

Manufacturers of:
DRUGS & PHARMACEUTICAL PRODUCTS
OF STANDARDIZED STRENGTH

4 PURITY
1, Jahar Lall Dutt Lane, Calcutta.

42 S.G.Q, Calcutta We have dealing with glass industry. Yelmak consult some book on glass management

bl T.B.K., Fyzabad Following, herb dealers: Bansidhar Putt, 120 k patty Street; Indian Herb Store, 14 Street; P. C. Dawn & Co., 1, Mechania Madhusudan Chatterjee, 19, Mullick, 19, K. Brothers, 46-1, Banstola Street Calcutto.

52 KAK., Bangalore-Following of snuff dealers: A. Jainalbedeen Sar-Mint Street, Madras: K. S. Sahib Snuff (*) 33-37, Muttu Naicken Street, G. T., Mad Mugam & Co., 40, Old Jail Street, Madras Snuff Co., P. O. Box 140, Shumogama Snuff Co., P. O. Box 140, Following is a list of tobacca metak-hmi Tobacco Export Co., Guntur, Tobacco Export Co., Kothapet, Guntan Majeti & Aka, Guntur.

53 N.T., Ambala Cantt. Following of Inbricating oil dealers: Anglo-Iranian (India) Ltd., Hongkong House; Associate Co., 6, Totee Lane; Burmah Shell Oil Sto Distributing Co. of India Ltd., Hongkong Lathousie Square; C. C. Wakefield & Co. 4, Royal Exchange Place; Caltex Co. (India) Ltd., United Insurance Bldgs, Cranjan Avenue and Standard Vacuum Co. 6, Church Lane; all of Calcutta, You consult Industry Year Book & Directional Distribution of this office, price Its. Including postage.

51 G.LA., Rewa Refer your query to Consul General for Norway, Imperial Char-Wilson Road, Ballard Estate, Bombay,

55 R.P.G., Rewa -Following is a libristle merchants: Khaitan Sons & Cobalhousie Square East, Calcutta; Cawas Sons, Opp. Anwarganj, Kanpur and Hind Lo., Mulbery House, Agra. For services match expert advertise in newspapers.

56 S.R.R., Shencottah We have no on toy manufacture. You may however em, of Thacker Spink & Co. (1933) Ltd., 3, Esple East, Calcutta for the book on toy industry.

57 J.G.S.C., Delhi—Process of ma peppermint, lemon extract and benzoin appear in due course.

58 D.D.S., Bombay-Process of manufaling robbin compound and pasting gum appear in due course.

59 B.Q.S., Patiala --We do not sell of publications. For British Pharmaceutical Cenquire of Das Gupta & Co., 54-3, College St Calcutta.

60 Z.H.S., Etawah—We have no elab..." book on paint and varnish manufacture.

61 M.S., Ottapalam—For enamelled she enquire of the following firms: Bengal Emans Works Ltd., 15, Old China Bazar Street, Calcutts Sur Enamel & Stamping Works Ltd., 9, Mind Road, Entally, Calcutta and Madras Enamel Works Ltd., 65, Sydenhams Road, Madras.

62 N.J.V.C. Murtazapur—Exhausted do cell has no use. You may separate the component parts and sell them in the market of advertising. Essential oils may be had

Annexe, Bombay; B. C. Patel & Co., ess Stree', Bombay; Essence Supply 6, Colootola Street, Calcutta and e & Sons, 3, Ezra Street, Calcutta.

ay be had of Ciba (India) Ltd., Jehangir splanade Read, Fort, Bombay; Hansraj & Co., 2A, Armenian Street, Calcutta.

Apperial Chemical Industries (India) Ltd., and Road, Calcutta.

G.E.R.S. Khanna Detailed process of acturing dry batteries will be found in facture of Batteries published from this price Rs. 3/9/- including postage.

4 V.Y.S., Bijapur Process of manufacag white colour Emp-Resina B. P. will appear a early issue of Industry.

66 HP. Alial For waste paper write to hettacherice, 312, Harrison Road and S. K. ha, 3t-IR, Harrison Road; both of Calcufta. Swin ink and lead pencil enquire of roupy Halder & Co., 11, Chittaranjan Avenue, mita.

67 R.N.V. Rohtak-For electric hunter to to General Electric Co. (India) Ltd., root House, Chittaranian Avenue, Calcutta Balmer Lawric & Co. Ltd., 103, Netaji blas Road, Calcutta.

68 A.P.A. Berwada -Process of manufacing (inema carbon will appear in due course.

70 GLB, Ranizanj-Bread making chines may be had of Small Machineries mufacturing Co., 22, R. G. Kar Road and dental Machinery Supplying Agency Ltd., P12, Ission Row Extension, both of Calcutta.

71 KR. Ferezenur You may consult one Industries published from this office, dec Rs 3/7/- including tostage. For elaborate ok on bread and biscuit manufecture enquire Thecker Spink & Co. (1923) Ltd., 3, Esplanade ast, Calcuita.

73 A.N.S., Chapra Before manufacturing hards you near treat tobacco leaves with mewater

71 RKP, Gondia Your query is in the adopted an advertisement so this cannot be bublished in these columns.

75 R B.V. Agra Hindi equivalent of the needlents is not available.

76 ONA., Colombo An article on textile rinther appeared in October 1950 issue of helistry.

77 J.V.R.S. Ambailpeta—Wood script manufacturing machines may be had of Francis Klein & Co. Lid., 1. Royal Exchange Place, Calcutta and T. E. Thomson & Co., 9. Esplanado Fast Calcutta.

91 G.T.B.C.O.M., Amritsar.—You may treat the some stock with caustic soda for improving its colour. You may use oil expeller for extracting oil mud. You may consult Vegetable Oil Todustries bublished from this office, price Rs. 3.7% including postage. It is not possible to start glass industry with small capital.

92 R.M.P., Kampala—You should dissolve 12 grain sodium potassium tartrate in 12 oz. of distilled water.

93 S.S.R., Simia—Following is a list of confectioners: Sini Confectionery Works, Sini; Patna Confectionery Works, Gudri Bazar, Patna; National Confectionery Manufacturing Co., 301 Cr. of Grant Road, Bombay; Ghose & Mitra Confectionery, 110, Raja Dinendra Street, Calcuita: Bengal Confectionery Works, 98-3, Canning Street, Calcutta and U. P. Confec-tionery, 71/1, Canning Street, Calcutta. Following is a list of fire works manufacturers: Baba Fire Works, Surat; Bonbanniere, P. O. Box No. 10827, Calcutta; Dipali Fire Works, Konnagar, Hooghly; Kaka Fire Works Factory, Kurla Road, Andheri, Bombay and Orient Fire Works 175B, Upper Circular Road, Calcutta. Following is a list of agarbati manufacturers: Mysore State Trading Agarbatti Co., 34-1, Ratu Sarkar Lane, Calcutta; M. K. Attar & Sons. Post Pachhapur, Belgaum; Mysore Anand Dhoon Factory, Kalamma Temple Road, Mysore; & Mysort Trading Agency, Basavangudi, Bangalore 4. Following is a list of fruit merchants: H. Fakir Mohamed Wazir Mohammad, 12, Ram Lochan Mullick Street; Golam Rabbani Mohamed Ayoob, 162, Harrison Road and Kishandas Kalidas, 12. Ramiochan Mullick Street, all of Calculta. Following is a list of glass manufacturers: Balsukh Glass Works, 7, Swallow Lane; Calcutta Glass & Silliate Works, 9, Kundu Lane and Javanti Glass Works Ltd., 8, Ezra Street: all of Calcutta. Exhaustive list will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including nostage.

91 D.V.V., Jamnagar—You should consult a handwrinting expert. You may advertise in newspaper for securing services of a handwrit-

ing expert.

95 S.M.W., Ludhtana—For transfer labels enquire of Stenograph Co., Baranagore, Calcutta.

96 N.P.D.P., Kajahandi — For wirenail and bin making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calculta.

97 S.P.A., Alinagar—You may start oil extracting business with Rs. 20,000. You have to invest Rs. 1 lakh for starting a glass factory. Plastic industry can be started with small capital.

98 N.G.P.P., Tuticorin We have no book or brick and tile manufacture. You may how-

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Phone: B. B. 514 & 5755. الراب الأراب والمرابع ومصيعا الراوسوسة أمراء فللبعوم وموسرها ويتهجم فا

ever enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta for the book. For machine write to Martin Burn Ltd., 12, Mission Row, Calcutta.

99 J.K.L., Hubli-We have no book on taxidermy, hypnotism and novels. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W. Newman & Co. Ltd., 3, Old Court House Street; both of Calcutta.

100 K.S., Doiwala-Mantles after been knitted impregnated in impregnating solution, dried and then burnt in a burner.

101 G.T.C., Kanpur-Process of manufacturing naphthaline balls will appear in due course.

102 H.S.M.S., Alur-All the chemicals you require may be had of Calcutta Chemical Co. Ltd., 10 Bonfield Lane, Calcutta.

Ludhiana-We have no book 103 R.K.S., on power loom. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and Das Gupta & Co., 54-3, College Street; both of Calcutta.

104 M.L.B., Agra-We have no book on dry cleaning and laundry business. For laundry machine enquire of Jessop & Co., 93, Netaji Subhas Road, Calcutta.

105 S.J.M., Bilimora-We have no book on jewellery and ornament manufacture. For the book you may enquire of Hamilton & Co. Ltd., 8, Old Court House Street, Calcutta.

106 K.A.K., Bangalore-Process of manufacturing artificial beeswax will appear in due COUTSO.

107 S.S., Gaya. For soyabean enquire of Khadi Pratisthan, 15, College Square, Calcutta,

119 S.A., Kolar-For wool shearing machine write to W. H. Brady & Co., Ltd., Mercantile Bidg., Lall Bazar, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission

Row Extension, Calcutta. 120 K.M.D.C., Cuddapah—You have take Drug Licence for manufacturing medicine and selling in the market. For particulars write to the Central Drugs Laboratory, Govt. of India, 110, Chittaranjan Avenue, Calcutta.

121 R.S.M., Ranchi-Following is a list of tanneries: Bengal Tannery Co., 31-14, Lower Modern European Chitpur Road, Calcutta; Tannery Ltd., 102. Topsia Rd. South. Calcutta; T. S. Tannery, 82, South Tangra Road, Calcutta; Patna Tannery, Paynental Garden Lane. Calcutta: Chrome Leather Co., Ltd., Chromapet, Madras; Tinnevelly Tanneries Ltd., Sta-

á

tion Road, Sermadevi, S. I. Ry.; Cawr. Tannery Ltd., Bhananapurwa, Kanpur; dusthan Tanneries Ltd., Jajmau Road, Ka and North West Tannery Co., Civil L Kanpur.

122 S.M., Bombay-We are not awai any firm that awards degrees of foreign un sities, such as London, New York and V ington.

123 L.S.R., Balasore-In order to rethe defect of ink powder increase the po of dextrine to 3 oz, in place of 2 oz.

124 A.E.W., Nasik-Process of man turing red lead will appear in due course

125 S.J.K., Khurja City -- Hand de cigarette making machine is not available, particulars of power-driven machine writ Small Machineries Mfg. Co., 22, R. G. Road, Calcutta.

126 J.P.A., Srinagar-For flour mill chineries and oil engines enquire of Ba Lawrie & Co. Ltd., 103, Netaji Subhas R T. E. Thomson & Co. Ltd., 9, Esplanade and Oriental Machinery Supplying: As Ltd., P-12, Mission Row Extension; al Calcutta.

127 T.N.R., Patna-For calendar you write to the Imperial Tobacco Co. of 1 Ltd., Virginia House, 37, Chowringhee, Calc

128 E.R.S., Berhampur-Hydrogen ge not available in cylinders. You have to duce gas yourself by adding zinc to sulpl acid. Balloons may be had of Swastik Ru Industries, Wardha, M. P.: Oriental Ru Factory, 52, Shri Krishna Niwas, Kalba Road, Bombay and Kundanmal Ramial, \$ Bldg., 78-80, New Hanuman Lane, Bombay.

129 I.A., Bhuj-For supplying cutlery may negotiate with the following firms: A Nasiruddin, 60, Canning Street, Calcu Mazumdar & Co., 113, Manohardas Ch Barabazar, Calcutta. S. H. Md. Ismail & S 58-8, Canning Street, Calcutta: Esoopally himbhoy, 205, Cutlery Bazar, Bombay and H. Abdul Karim, 215, Cutlery Bazar, Bomb

130 D.A.P., Badulla—For tyre retreat machine enquire of Kilburn & Co. Ltd., 4, 1 lie Place, Calcutta and Mother & Platt 1 Bruce Street, Fort, Bombay. For securing expert in tyre retreading advertise in no papera.

132 B.M., Berhampur-All the chemi you require may be had of Calcutta Chem Co., Ltd., 10, Bonfield Lane and Allied Age 16. Bonfield Lane: both of Calcutta.

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Patna-Envelope making manes may be had of Oriental Machinery Suping Agency Ltd., P12, Mission Row Exten-. Calcutta. Lathe machines may be had Heroes Engineering Works, Ltd., 20, Paul cet. Calcutta.

126 A.G.A.B., Banaras City-Stationery I plastic goods may be had of Bengal Staiers Syndicate, 1, Mission Row; City Stanery Mart, 14.2, Old China Bazar Street, hi Bakhsh Bros & Co., 3, David Joseph ne: Jayantilal & Co., 55-131, Canning St.; tar Nath, 40A, Armenian Street and M. S. ned & Co. Ltd., 58-6, Canning Street; all of rntta.

137 S.B., Madras-For suitease fittings enic of Patel Brothers, 34, Strand Road, and 19's Hardware Emporium, 107, Chandney iwk: both of Calcutta.

138 S.L.M., Meerut-We have no book on uloid manufacture. You may however enre of Thacker Spink & Co. (1933) Ltd., 3, danade East, Calcutta and Standard Literao Co. Ltd., 13-1, Old Court House Street, mitta.

144 S.M.A., Bahrain-You may consult ustry Year Book & Directory published from office, Price C1 fish, including postage,

151 P.G.P., Bombay-Dip the garment in cleaning solution, rub thoroughly then dry iron. Radio receivers are not manufaced in India at present. Radio receivers are orfed by the following firms: Phillips drical Co. (India) Ltd., 2, Heysham Road; C. Saha Lid., 20D, Lindsay Street; R. C. & Sons, 161/1, Harrista Road; N. B. Sen Bros., 11. Esplanade East and C. C. Saha , 170, Dharamtala Street; all of Calcutta.

153 A.K.B., Allahabad-We have orate book on calico printing. You may rever enquire of Thacker Spink & Co. 33), Ltd., 3, Esplanade East, Calcutta.

157 M.M.M., Lakhyaj-Replies of queries generally published free of charge in al order. Questions are replied by post on int of As. -/8/- stamps for each question. 158 S.N.R., Motihari-You may consuit etable Off Industry published from this on price Rs. 3/7/- including postage. e no book dealing with the process of ufacturing sugar from gur. You may te to the All India Village Industries Association, Maganwadi, Wardha, M.P. for a book on sugar making from gur.

161 R.K.M., Coimbatore — For latex enquire of Mundakayam Valley rithher Rubbar Co., Ltd., Mundakayam. Travancore; P. T. Thomas, Mundakayam, Travancore and Murphy Estates Ltd., Mundakayam, Travancore. For chemicals enquire of Najmuddin Bros., Akbar Chambers, Mohamedali Road, Bombay 4.

162 C.R.R.T., Tellicherry-You may consult Manufacture of Confectionery published from this office, price Rs. 3/7/- including postage. Confectionery machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcuita. We have no book on steel trunk manufacture. For machines enquire of Alfred Herbert (India), Ltd., 13-3, Strand Road, Calcutta.

163 I.T., Meerut City-You have to secure Export Licence for exporting horbs and drugs from India. You may negotiate with the following firms for exporting herbs: M. Allison & Co., 162, Water Street, New York; Asiatic Trading Co., 235, West 29th Street, New York; Iran American Trading Co., 505. Fifth Avenue, New York.

164 V.A.C., Kumbakonam-Following is a list of stick lac dealers: Jagadish Brothers, Dankingunj, Mirzapore: Garilo Ram Chedi Lall, Sabri Mirzapore and Gopaldas Kanhiya Lall, Muzaffarganj, Mirzapore.

165 L.B.T.C., Bombay-Surma is trisulphide of antimony purified by fusion and reduced to a black powder. The powder 15 used as an application to the eye lids and eyebrows. Detailed process of manufacturing surma will appear in usual course.

166 B.C.D., Gauhati - Process of mirror making appeared in April, 1950 issue of Industry.

168 U.S., Delhi-Process of manufacturing pencil will be found in Industry Prize Articles Vol. I published from the office, price Re. 1-15 including postage.

175 B.T.A., Gandhidham — Soda water making machines may be had of Essence & Bottle Supply Agency, 14, Radha Bazar Street,

177 C.P., Gudivada-Process of tanning and coolouring leather will appear in due COUTSe.

178 K.T.C., Bombay—Following is a list of tin factories: Bengal Tin Box Mfg. Co. Ltd., 1. Jadunath Mitter Lane; Calcutta Tin Factory. 14/2, Nirod Behari Mullick Road: Colour

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Printing & Hollowware Works Ltd., 243, Upper Circular Road; Dhur Tin Factory, 101, Aukshoy K. Mukherjee Road; all of Calcutta. For an exhaustive list consult Industry Year Book & Directory published from this office, price Rs. 164 including postage, Following is a list of Sugar Mills of S. India; Colmbatore Lakshmi Sugar Mills Ltd., Podantur; Erikop paka Sugar Factory, Etikoppaka, Vizagapatam, Hospet Sugar Mills Ltd., Hospet, Bellary and Sri Rama Mills Ltd., Bobbili, Vizagapatam.

180 S.S., Colombo For paper curs enquire of Bengal Cardboard Industries & Printers Ltd., 156, Cornwallis Street, Calcutta.

184 G.D.S.C., Kanauj Process of manufacturing aromatic chemicals will appear in due courso.

185 E.P.P., Aurangabad For florentine orris enquire of F. N. Sirkar, 37, Cataling St. Calcutta and Gloss Book, 59, Cyra Street Calcutta,

186 I.E., Agra -- All the chemicals referi ed to by you are used in dyelng yarn and cioth and in printing cloth.

189 O.P., Delb! - Industrial diamonds. corundum and other hard fromes are used for cutting glass.

192 A.M.F., Goa Process of making artificial cocoa butter will appear in due com-

193 D.R.M., Banaras For sewire thread enquire of Acme Thread Co., 37, Canning St. Calculta. For reel winding machine enquirof W. H. Brady & Co., 15d Mercantile Bl. 5. Lall Bazar, Calcutta.

194 G.U.C., Madras You may start link tablet manufacture, avaibatti technifacture and toothpowder manufacture on small scare,

195 P.P.R., Koranut Steel founks and suffcases may be had of Arry Bhardar 90.25 Harrison Road, YMCA, Bldge-; Brack Factory, 8, Broin Dulat Street: Modern Trunk Factory, 34, Harrison Read and National Truck Mfg. Co., 12, Old China Barar Street: all of Calcutta. For from sife, with fact the S. Co., 70-1. Netati Subhas Road and Roy & Co., 100, Harrison Road; both of Calcutta.

197 G.L. Amritar Following is a list of foreign trado commissioners in India: U K Senior Trade Commissioner in India, Eastern House, Mansingh Road, New Delhi; Senior Australian Govt. Trade Commissioner in Inlia. Menkin Bidg., 10, Outram Road, Bombay 1;

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207 SAA, Sukkur You may consu' Home Industries and Prospective Industrie both the books published from this office are price Rs. 3/7/. each including postage,

211 RB. Aljal - For fruit preservin apparatus scare to Original Machinery Suppl ing Agency Ltd., P12, Misston Row Extensio and Marshall Sons & Co. Ltd., 99, Neta-Sight: Pood Folk of Calonta

212 LF.T.C., Barelly Process of dec decising and reducing tripled of will be founin March, 1951, issue of Industry. It is no possible to manufacture coaltar on small scal-

213 APA Bezwada Process of manu facturing cinema carbon will appear in at early is ue.

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-REVIEW OF BOOKS

MODERN AGE AND INDIA. Edited by A. BOSE, M.A., Ph.D. Published by Leftist ok Club, 186, Bowbazar Street Calcutta 12, ces 26j. price Rs. 6/-.

The book under review marks off the ce for economic and political experimentan in various countries and India down from eventeenth century to the present day. a book is a collection of articles by eminent phers on twenty subjects, e.g., Spirit of the COLUMN Are, First Revolutions, French Revolun. Piductifal Revolution, Russian Revolu-1. Colonial Revolution, Political Ideologies, pitalism, Socialism, India's Struggle For cedem, India's Economic Problems, The book than presents an intelligent, act tert, account of the main currents of · social and political ideologies now occupythe air mind all over the world. The book es with a number of chapters dwelling on evolving constitutionalism in India with , ecount of the political programme of differ- political parties working in India for India's stud and economic uplift.

PLANNING FOR THE INDIA'S MAN WER by Uma Charan Painaik, M.A., B.L., L.A. (Orissa), Advocate, Orissa High Court.

The book under review is in fact a memomain submitted by the author to the account of India with relation to planning India's man power. The author believes of octal and economic freedom for feeming hons of India can only be achieved by a and mobilisation of India's vast manpower all out and all-round development drive. The dictionages a comprehensive scheme for the reamisation of India's human resources. hor strongly urges the coordination of the con building and defence departments and utilisation of defence machinery for produce and constructive purposes. Here is an net which has not received adequate aftenir in this country. The Civil and Defence council in addition to the Centre and the des have to work in unison from top to ona at every level for this purpose. one essentially means that the task of arrong education, training in aviation, ustries, trades and agriculture have to be rosted with the top heavy Defence Departnt and that suitable provision has to be made the demobilised persons to help in the intry's development drive and to maintain mselves without a pension through trades, ustries and agriculture. The major part of book is devoted with this aspect of planning lough references have been made to developat of agriculture, industries etc. for the terment of the lot of the Indian people. The morandum is thought-provoking and deserves usal. The suggestions, if followed, will lead most desirable results but it does not strike t the Defence Department, as it is now stituted, is quite competent to take up the

responsibilities to be thrust upon it. It will however be advisable to give the scheme a fair trial by accepting such suggestions which are capable of being put to practice immediately.

BENGAL KAMINE by Tarak Chandra Das, M.A. Published by University of Calcutta, Darbhanga Bldgs., Calcutta. Pages 154, priox Rs. 6/-.

It may not be known to many that the victims of the Bengal Famine of 1943 far outnumbered the victims of the battle-fields of the last Great War. Destitutes thronged in thousands in Calcuta for a morsel of food. and died on the pavements unknown and unmourn-More than 97 per cent, of them were inhabitants of West Bengal and mostly derived from the lower strata of both Hindu and The socio-economic Muhammaden society. condition of these people formed the subject of a study by the Department of Anthropology of the University of Calcutta. The book under review traces the causes leading to the influx of the destitutes into Calcutta in 1943 and a pen picture of the life they led there. The book aims at supplying data about their main occupations, assets, Indebtedness, social disintegration, etc. There is a full chapter analysing the general causes of the famine which have been classified under two broad divisions, viz.; The principal basic and immediate causes. Insufficiency of basic causes are stated to be: the staple food-grains produced in the province for its population, smallness and scatteredness of agriculture holdings, smallness of margin between subsistenace and starvation of the Bengalees connected with land, extension of the cultivation of jute at the cost of foodgrains, physical degeneration of 'the people produced by malnutrition and malaria. Among the immediate causes of the famine are natural calamities like flood, and cyclone in some parts of the province, hourding of rice by farmers, merchants and well-to-do consumers, ineffective price-control by the Government of Bengal, denial policy, dislocation of transportation. inflation of currency, official corruption, etc. There is also a test survey of famine condition in Bengal villages from November 1943 .0 March 1944. A large number of illustrations and charts enhance the value of the book,

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CONGRESS PUBLICATIONS

The following publications of the All-India Congress Committee, 7, Januar Mantar Road, New Delhi have been received in our office:—

(1) Third Year of Independence, August 1949-August 1950, pages 119 price Re. 18-0.

1949-August 1950, pages 119, price Re. 1-8-0.

This volume records the general progress made in the affairs of the State by the Central and Provincial Grovernments and presents an account of the economic progress during the year on various subjects as Budget, Education, Public Health, Local Self-Government, Transport and Communications, Labour, Rehabilitation, etc.

(2) Ghief Ministers Speak, pages 241, price Ra. 2-8.

This volume coming from the pen of Chief Ministers of the States in India, gives authoritative versions of the work achieved in various spheres in the States.

Both the books are fully illustrated.

CHITTARANJAN SPECIAL

The establishment of the Chittaranjan Locomotive Works will constitute a landmark in the development of italiway enterprise by the State in this country. The workshop will enable India to become self-sufficient in regard to all that appertains to our Railways. The project deserves to be more widely and properly appreclated. The East Indian Railway Magazine la therefore to be congratulated upon publishing a Chittaranjan Supplement which contains all particulars about how the Locoworks were started, how it was developing and what it would do. The Supplement is fully illustrated and will serve the purpose it was intended for. Price Rs. 3/-. It may be had at Fairlie Place, Calcutta.

A BOOK ON DOLLAR-RUPEE CALCULATION

We have received a copy of book entitled, Dollar-Rupes Exchange Calculator, by R. N. Sanyal. It contains useful tables of converting dollar into rupes and rupes into dollar at the discount, commission and interest tables. The present rate of exchange furnished with the book will be helpful to businessmen who have transactions with U. S. A. It is published by Messrs Sanyal & Co., 1/1A, College Square, Calculta 12. Its price is Rs. 9, 7.

THE EASTERN ECONOMIST

We have pleasure in receiving a copy of the annual number 1950 of the Eastern Economist published by the Eastern Economist Ltd., New Delhi. The annual number is broadly divided into two sections vis: (1) Analysis of India's sconomic life in relation to other countries in the World, and (2) the Nation's Economic lystem in 1950. The first section shows where nodia stands in the national income scale, how her agricultural production compares with that f other countries, how the industrial structure 1 undergoing changes under pressure of World rents and ends with a political epilogue. The scond part surveys the Indian position in 1950 far as Indian agriculture, trades, industries.

stocks and shares, banking, etc. were co. There are a large number of chariplain and coloured, illustrating the bal trade, direction of trade etc. The articles ed in this Number are interesting in their and are marked with a refreshing outlithe future of the country. We wish the I wide publicity. This particular Numpriced at Rs. 5/-.

NOTICES & REVIE'

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British industries fair

We have received a copy of the Tin-Survey of British Industries Fair to be held London and Birmingham simultaneously tween April 30 to May 11, 1954. A special sig fleance attaches to this year's Fair as it coincid with the festival celebrating the centenary the Great Exhibition of 1851. This issue show how virtually every industry has been tranformed beyond recognition during the centur, Industries discussed in this number are Chemicals, Scientific Instruments, Glass and Ceramice Toys, Sporting Goods, Hardware, etc.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning industry).

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72 The Eagle Advertising Tape Factory. Eagle Wadi Kurla, Bombay—Want to be put in touch with the manufacturers of gummed paper tape roll of different sizes.

145 Ram Singh, C/o. New Bharat & Co., Eagle Wadi, Kurla, Bombay—Want to be put to touch with the manufacturers of celluloid plastic sheets.

193 Des Raj Madan, Guru Bagh, Banaras— Wants to be put in touch with the manufacturers of foot rules of wood and plastic.

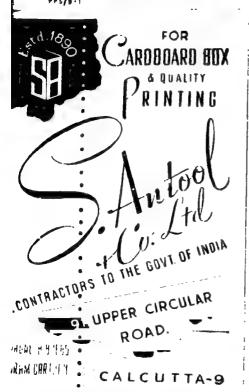
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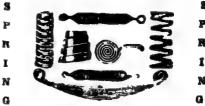
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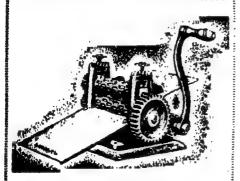
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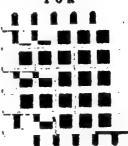


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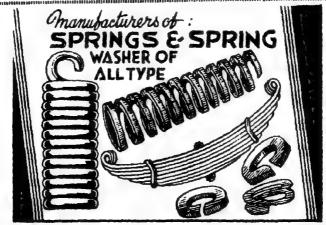


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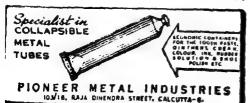
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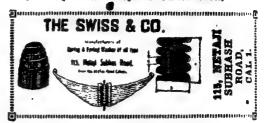


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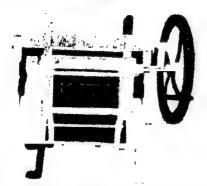
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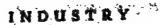
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CALCUTTA, MAY, 1951.

No. 494.

POPULATION AND FOOD

THE provisional figures of the 1951 Census just released by the Census Commissioner reveal a lot of interesting facts which need be taken into consideration in planning for the Indian Union as a whole.

The memorandum shows that the total population of the Indian Union, excluding for the time being that of Jammu and Kashmir, stands at 35.68 crores as against 31.48 crores in 1941 in the same territories now covered by the Indian Union. The population thus records a rise by 4.20 crores or 13.4 per cent over that of 1941. If to this we add the population of Jammu and Kashmir which aggregates 43 lakhs on March 1, 1950, the total population reaches the figure of 36.98 crores. The density of population thus comes to no less than 296 per square mile which compares with 123 in China, 23 in U. S. S. R., 50 in U. S. A., 135 in European countries, 210 in Pakistan, etc.

That there has been alarming rise in the population of the Indian Union will be evident from the fact that while during the decade 1921-31 the population rose by 27 lakhs annually, this rose by 39 lakhs annually during the decade 1931-41 and by 46 lakhs annually during the period covered by the present Census.

The population figures reveal that with 2.4 per cent of total world area and 15.1 per cent of total world population, India has a per capita of only 0.70 acre of agricultural areas and 0.24 acre of forest and woodlands. Taking into account the fact as asserted by the U. N. Secretariat which recently investigated about the food grains requirement of the world that 2.5 acres of cultivated land is necessary to feed a single human being throughout the year, hopes of attainment of food sufficiency in India become remote and there is great apprehension that a permanent shortage of food will continue in India unless efforts are now made to make scientific use of all available lands and introduce better system of cultivation with better seeds and manures. The problem of food supply in India is a very urgent one and must be faced with foresight and imagination. She cannot depend indefinitely on foreign imports, specially because the world population being on the increase at the rate of 70,000 a day, the chances of securing good stuff from foreign lands are also narrowing down.

-CURRENT TOPIC

GLASS INDUSTRY IN INDIA

The problems of the glass industry in India came up recently for a comprehensive review before the Planning Commission. It is stated that there are in all in operation 101 factories of all types of glass and glassware (excluding sheet glass and bangles) and their installed capacity is about 1,83,440 tons. ing to this a capacity of about 28,000 tons for 33 units which have suspended production during the past two years, the total installed capacity comes to about 2,11,440 tons per annum. The sheet glass section consist of three units with a total installed capacity of about 23.4 million square feet. Besides, there are, about 100 factories of varying sizes, mostly on a cottage industry basis engaged in the manufacture of bangles.

It is understood that the production of glass and glassware (other than sheet glass and bangles) had been steadily increasing from about: 66 000 tons in 1948 to about 81,000 tons in 1950. The sheet glass section, which had reached a peak production of 13 million square feet in 1944-45, suffered a setback during 1949, owing to excessive imports during the two preceding years. But, in 1950, there would appear to have been a recovery to 9.57 million sq. ft., approximately equivalent to 5,000 tons. The value of the current consumption of all types of glass and glassware is estimated to be over Rs. 10 crores, of which the indigenous production accounts for about Rs. 8 crores.

Improvement in quality depends on proper processing of sand. It has been most important raw material. It was accordingly suggested that all large factories should establish sand-washing plants, while small ones should combine and erect tentral washing plants at important

centres from which sand might be of ed. Sand from Travancore is state be of very good quality needing no ing and offering easy transport by manufacturing centres in Bombay, manufacturers are also advised to the advantage of the testing and transfacilities offered by the Central Glace Ceramic Research Institute at Calcut sending samples of raw material finished products to the Institute examination. The need for account wastage of coal to reduce cost also been emphasised.

At present, only three glass fact: are stated to have been equipped, automatic machinery, the others may ing mostly with semi-automatic mach It was pointed out that caution was no ed in regard to the introduction of acmatic machines, because the market in " country for mass-produced goods litt automatic machines was limited and pace of standardisation was slow. It is however, emphasised that there definite advantages to be secured ... automatic machines, such as uniform and economy in raw material consumpti Only one of the firms engaged in man facturing neutral glass was stated to he installed tube-drawing and automat ampule-making machines. A scheme manufacturing neutral glass in collaboration tion with an American firm has alice been approved by the Government.

INDUSTRIAL FINANCE CORPORATION

The working of the Industrial is ance Corporation was recently discussible for the Rotarians. The Industrial is ance Corporation in India established 1948, for rapid industrial reconstruction and development is a new experiment it is therefore regretable that in the

v. the Corporation has been exsubscribprohibited from rectly to the shares or stock of any limited liability company. Such is calculated to restrict considerably tope and serviceability of the Coron and to prevent it from pursuing methods of finance. What is tly required is not provision of mere capital but "risk" or "enterpreneur" I. The Corporation is not a bank. st be prepared to take much greater han a commercial bank, if it really to assist in rapid industrialisation country, especially at a time when te capital is not coming forward gh the formation of joint-stock anies.

he loans advanced by the Corporalave generally been made for a period
2 years and sometimes for 15 years
against the first mortagages of the
assets of the companies like land,
ling plant and machinery. As a rule no
nees are granted against hypotheticaof stocks of raw materials and finished
s for working capital. It is considerat if the I.F.C. extends the period of
ban to 20 years or more it will be a
help to its borrowing customers.
for development and carning of

further in making advances the Cortion should have adequate evidence the loans are being used for the purfor which these are granted. It is ested that under the Corporation a all technical investigation department sting of engineers, building experts, accountants etc. should be set up in to act in close liaison with the borng concerns and not only to carry on dical investigation into the working e concerns and give timely warning e Corporation when symptoms of

danger are discerned, but also to make available to the customers the benefit of their expert advice.

Another serious defect in the Corporation is the absence of a department of economic research. It is high time that the Corporation appoints an economic adviser or director of economic research and takes steps to constitute an economic intelligence section.

WEST BENGAL INDUSTRIES

It is understood that the scheme for manufacture of penicillin under the auspices of the West Bengal Government will be finalised soon and technical personnel for the purpose is expected to arrive early.

As to manufacture of DDT and false plastic teeth in West Bengal, the State has to get a permit from the Government of India in respect of the former and orders have already been placed with a Swiss firm for machinery in respect of the latter. The machinery is expected to arrive soon. The manufacture of DDT alone will be shared with private enterprise.

Setting up a factory for manufacturing of salt on Contai sea-coast and execution of a number of electrification schemes are also under Government's contemplation. Of these North Calcutta Electrification Scheme has already been in progress.

Besides these. Government are running certain production units for the expansion and development of such cottage industries as khadi, silk, handloom weaving, handmade paper and ceramics. Government it is understood, has however no intention of acquiring any existing trade or industry in the State.

ELECTRIC FANS

At present there are about thirty factories in India manufacturing electric

ians on an organised basis. The total capacity is 310,800 fans a year. Calcutta and the industrial suburbs have the largest concentration of fan-making units in the whole of India. As many as 17 factories are situated in West Bengal turning out over 68 per cent. of India's total production of fans. The present annual demand for ceiling and table fans is estimated to be 140,000 and 60,000 respectively. The demand is in fact flexible and increasing every year with the improvement in the standard of living and with the increase in the area electrified and the number of new towns and cities.

In view of the decision of the Government to fit class III passenger coaches with electric fans, the demand for railway carriage fans is showing a rise. While the present demand for this kind of fans is estimated normally at 12,000 a year, it is quite possible that it will double or treble itself within the next two or three years. There are at present at least eight firms manufacturing on an average 1000 carriage fans a month.

It may be of some interest to note that the ratio between the cost of indigenous raw material and components and that of imported stuff is forty to sixty. This means that the bulk of the raw material is indigenous. Until two years ago we had to depend on imports for the supply of electrical steel sheets. To-day the electrical steel sheets of the dynamo grade produced in India are more than sufficient to meet the requirements of the fan industry.

In manufacturing ceiling fans the Indian industry is setting new standards of efficiency. Efforts are now being made to perfect the oscillating mechanism in a perfect that the industry had not yet been able to manufacture satisfactorily. The fan industry is still dependent on im-

ports of enamelied wire and materials and to a certain exterequirements of high class provenishes.

It is encouraging that despite cuties the Indian Fan manufadustry has shown efficiency in a ling an ever-rising curve of prowhich may reach a level of examplus of its ability to neigh countries in the near future.

DEVELOPMENT SCHEMES IN PARIS

The development schemes in I for the year 1951-52 were envisage the Budget Speech of the Finance ter of Pakistan.

It is said that the six-year di ment plan of Pakistan represents the endeavour to improve the con objectives of the country and account of its basic requirements. economic council, with full powers plement the plan, and Planning Co. sion with sub-commissions have here up. Expert advice has been obtaine! some of the projects included in the have been examined by the experts of International Bank which has expir readiness to negotiate loans for Paks and to meet the requirements of exterfinance to the tune of sixty million de-

One of the fields in which there h been considerable improvement that of cotton textiles. Pakistan i present producing about one third character total cloth requirements and the outs. will be substantially increased by the end of December 1951. Orders for 1 lakh spindles, costing nearly Rs. 8 cures will shortly be placed on behalf " Government, in addition to an equi number of spindles allotted to private parties. When this present programme of nearly nine lakh spindles is completed the country will have enough capacity to roduce twelve yards of cloth per capita. iteps for the manufacture of woollen extiles have also made considerable proress and a purchase mission has gone broad to finalise the purchase of tachnery and other equipment for two lovernment mills.

Three jute mills, for which machinery ave been ordered, are under construction at Narayanganj (East Pakistan). One of them is expected to go into production by the middle of the year, followed by the second mill in 1952 and the nird mill in 1953. Pakistan Government as also agreed to participate in the tablishment of three other jute mills.

Exceedingly good progress has been ade with the paper mill project and it is oped that by the middle of 1952, the untry will become largely independent imports of quality paper. Other dustries which have registered apprecide progress include chemicals, soda sh and caustic soda, leather, cement, parmaceuticals and coal-mining. The evelopment of coal mining has resulted the production of coal going up by early 30 per cent. It is further noted at Rs. 82 crores have been earmarked or agriculture in the six year-developent plan. Government is planning to set an Agricultural Development Finance orporation with a capital of Rs. 5 cros. and a bill on the subject will be troduced in the legislature in the rrent session.

The development of commercial maing has made steady progress tring the year and 29 new offices— 7. West Pakistan and 12 in East Pakistan have been opened by scheduled banks, he National Bank of Pakistan has ened 8 new offices bringing the total mber of its offices to 16.

NEW INDO-EGYPTIAN TRADE PACT

The Commerce and Industry Ministry lately announced the conclusion of a fresh trade agreement betwen India and Egypt. The agreement takes retrospective effect from March 1, 1951, and is to remain valid upto February 29, 1952. The last agreement between India and Egypt was from July 1949, and it expired in July last. After the expiry of the last agreement, a barter pact was concluded providing for import of rice against jute goods while the renewal of the agreement was under consideration. The new agreement makes no provision for the import of foodgrains from Egypt and export of jute manufactures from India, but it is understood that a separate pact will be concluded later to cover these commodities. In 1948-49 the value of India's imports from Egypt were Rs. 31.89 crores and exports Rs. 7 crores. In 1949-50 imports totalled Rs. 39.4 crores and exports Rs. 7.85 crores while for 1950-51 (upto December 1950) the corresponding figures were Rs. 18.77 crores and exports Rs. 4.02 crores. From Egypt cotton is the principal commodity India imported. Under a clause in the agreement the two countries will accord to each other "the most favoured nation treatment".

Exports from Egypt to India under the new agreement will include raw cotton, cotton yarn, gypsum and flax. Exports from India to Egypt will include tea, unmanufactured tobacco, certain oils and oil seeds, shellac, coffee, cotton piecegoods, manufactures of iron and steel, cutlery, electrical goods and sanitary ware.

ATOMIC RESEARCH

That valuable deposits of atomic energy minerals have been discovered in India is gathered from the reply by Shri Sri Prakasa, Minister for Natura! Resources and Scientific Research while

onding Material - The bonding ial used in crucible industry should highly plastic and have good coverower, (ii) afford good protection to against oxidation, (iii) capable of ion to graphite grains and ensure late green strength, (iv) free from itits - particularly grains of lowig fluxes, and (v) have adequate reriness and dense texture, resistance g action at the temperature at which ucible is applied, and be thermo-: at that temperature. Of these. st condition is important. Graphite les are used for melting widely differing melting tempera-Thus, while a crucible for brass

ing must have adequate strength

and resistance to penetration by slag or metal at temperatures near about 1100°C, the crucibles for cast iron must have the same strength at 1250°C, and that for steel in the range of 1400° to 1600°C. Thus, the importance of a thorough knowledge of refractoriness and other properties of clays at high temperature becomes obvious in crucible manufacture.

FORMING METHODS

Body Mixer & Mixing Procedure— Much of the information on this subject is a trade secret and is not easily available. Some of the compositions tried on a laboratory scale and found satisfactory are given in Table I.

Table I.—Crucible Mixture Compositions.

Constituents.		(a)	(b)	(e)	(4)	(n)	(f)	(g)	(h)	(i)	(i)	(k)	a
aphite, %	*****											44	
1y, %	00-740	40	37	36	35	34	32	*1*1)	32	31	31	30	30
icon carbide, %	****	10	13	12	12	14	16	18	12	16	10	16	10
og (% of the teral)	hody)	5	5	5	5	5	5	5	5	5	5	5	б

r steel-melting crucibles, kaolin, in tures with more plastic bentonite all clays, forms a suitable bonding al. Siliceous clays, Jubbulpore and ra varieties, may prove suitable for on melting crucibles and the same mixed with bentonite or plastic al of lower: fusibility may prove e for brass founding crucibles. For and other low temperature melting, the crucibles have to have a bond suits those temperatures. This of crucible industry has not received attention in India.

India, the choice of bonding clays ted to a few siliceous fireclays of ta and Jubbulpore and the alumiclays from Messrs Bird & Comclay quarries. These clays have which refractorings in the range made with these clays have given a toler ably good service in the cast from foundries. Below this range, they are highly permeable and above this, refractoriness, particularly of Rajhara and Jubbulpore clays, deteriorates rapidly, and their strength is inadequate for stee foundry.

Fireclay Grog—In U.S.A. and other foreign countries only graphite and bond clay go into the crucible mix. Recently, however, carborundum is replacing a part of graphite. The use of silicon carbide is not manufacturtd in this country and is very costly. The fireclay grog used is usually of the same clay as has been used in the bond. Clean graded grog is usually employed.

The use of hinders plasticizers and

terature. In this country, however, the se of such ingredients, particularly alkales and alkali silicates, has not found ayour.

The clay in compositions (a) and (b) and a mixture of Jubbulpore fireclay and bentonite in the ratio of 95: 5. Jubbulpore clay was used in others. The following is the grain size of the constituents:

	Grain size between
Graphite	40 to 100 mesh.
Silicon carbide	50 ,,
Clay	100 ,,
Grog	16 ,,

The mixing of ingredients by such methods as pugging by feet, in vogue in India, are inefficient and large quantities of air gets entrapped in the wet mix. Also manual methods of mixing need a higher percentage of water than mechanical methods. Both these factors render the resulting body porous. Porosity may be a distinct advantage in a fireclay grog body as it gives certain amount of resistance to thermal shock, but is, to a large extent, unnecessary in a graphite clay body, as it increases the vulnerability of the crucible wall to metal and slag penetratton. It is, therefore, considered better to mix the constituents dry in a suitable buyer, and knead the mix with minimum printity of water in a Werner Pfleiderer ype of kneading mill or pass it through i de-airing pug mill. This may give a corkable mix with enough green strength stand forming and finishing.

Crucible-making—The usual methods aployed in making crucibles are (i) agering in plaster moulds, and (ii) ressing in steel dies in hydraulic or chanical presses. The Indian manufacturers, however, have adopted a differnt method. A wooden or machined cast in mould and a plunger of similar Vol. XLII. No. 494.

material are usually employed. The manual operations involved in the process increases the cost of manufacture and uniformity of products is not obtained.

Graphite crucibles depend for their mechanical strength and conductivity or the orientation of the graphite particles in the body. Thus (i) the flakes should be parallel to each other and parallel to the outer surface of the crucible wall, and (ii) must be as closely packed together as possible. In the forming process, therefore, the pressure applied must be so directed as to achieve the above orientation and the pressures used in the various stages of forming must, as far as possible, be similar to each other in direction.

The authors are not aware of any slip-casting work done in graphite crucible manufacture. The slip-casting method, however, has its advantages for the production of crucibles in the small size range (gold and silversmiths crucibles) and may be worth investigating, particularly as it is easy to get dense, thin-walled ware by this method. Similarly, dust-pressing and hot-pressing methods have certain advantages. One advantage is that items like ladle plugs, stoppers and lids can be mass produced. These are promising lines for investigation.

For satisfactory drying of green crucibles, it is necessary to have a good control over humidity, temperature and speed of the draught of air employed for drying. In the absence of proper control, internal weaknesses develop in the crucible walls and there will be a lack of uniformity from one batch of crucibles produced to another. Thus, standardization of drying methods, design and application of suitable driers are of great importance in this industry.

Glazing—Glazing of graphite crucibles is necessary as, in the initial stages of THE WALL STREET

service, the finished, unglazed crucible absorbs moisture from the atmosphere, which is hamalul. Besides, the graphite particles may get oxidized. The glaze is to usually a felspathic glass high in all mangane e dioxide. It is fritted, quenched and slip ground to the required fine-claness. This slip is applied by brush on to next the dry green crucible before further give drying.

The composition and mode of application of the glaze has not been fully examined by Indian manufacturers. High manganese dioxide glazes are difficult to melt because they need comparatively high temperatures and longer founding time. As they are usually deep violet in colour, it is not easy to determine whether all the batch ingredients have melted. In many instances manganese dioxide continues to remain in a state of suspension. This fact has been overlooked by the Indian manufaturers, who have been mixture unfritted applying an manganese dioxide and other glass batch ingredients. Secondly, no attempt has been made to fit the glaze to the body. There is no universal glaze which can fit all types of bodies and each individual body needs a suitable composition.

Firing—The Indian manufacturers employ ordinary coal-fired, down-draft kilns for the purpose. The crucibles are set in saggers, the smaller sizes being nested in larger sizes. The saggers are filled tight with coke dust. Each sagger has its own lid luted on with a fireclay-grog paste and the individual sagger bungs are further luted with the same paste as a precaution against leakage of furnace gases into the saggers and burning away of coke. The arrangement has worked out very satisfactorily.

The firing schedule consists of a preliminary drying period in which the kiln the there until all the moisture has been the moved. Then the fires are built on the the temperature is raised to 500 C about 3 to 4 hr. Between 500 to 650 a soaking (for the combined moving clay to go out) is given. Temperature next raised to 1000°C., another make given at this temperature for next letter all over) and then the kiln is the to 30 hr. Strict precautions are taken prevent ingress of air into the kiln is the cooling.

When the furnace has cooled accrucibles are taken out and given a soft varnish and stored in waterproof or a before despatch.

SERVICEABILITY

For satisfactory service a cru de must have (i) an adequate refractor de under load, (i) a high thermal decresistance, (iii) thermoplasticity, decresistance to mechanical abrasion, and the resistance to slag and metal attack.

The Indian graphite crucibles in given reasonably good service in the iron foundry field. Up to size 60. crucibles have given a good performance Sizes beyond number 80 have given in performances. Salamander crucibles 🛷 on an average 30 heats in a pit furr of The Indian crucibles have somet given 26 heats, but in general are salisfactory. An important property the Salamander crucibles that the India crucibles do not have is that the for are serviceable even when they has worn out very thin. This indicates a " markable uniformity of texture of the Salamander crucibles.

CONCLUSION

It will be apparent from the foregoin that the Indian crucible industry suffice namely (i) selection of bonding tal leaves much to desire inasmuch crucibles are unsuitable for applicatin non-ferrous and steel foundries. Letailed study will have to be made of clays available for the purpose in lia and suitable blends will have to be veloped, (ii) manufacturing methods

need mechanization and standardization.

(iii) the protective coats for the crucibles should be studied, and (iv) processing of the body constituents and forming ware are problems that require investigation. The future success of the Indian crucible industry depends to a great extent in finding satisfactory solutions for these problems.

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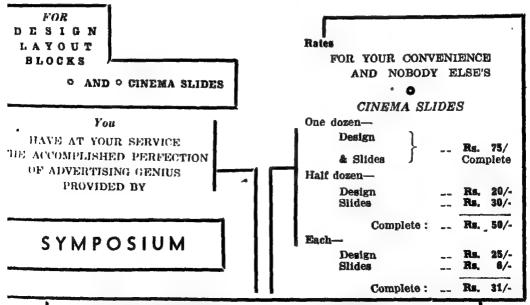
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-MANUFACTURE OF BELTING LEATH

LEATHER belting is an important article in engineering workshops. Without this the efficiency of the work is much hampered. This belting leather is made from strong buffalo and ox hides.

Leather belts must be tough, flexible, fairly resisting to heat and not too greasy. Formerly vegetable tanned leather suitably carried was used for the belts. But now-a-days chrome tanned belts are preferred, as they are very tough, flexible and stand heat much better than the vegetable tanned variety.

RAW MATERIALS

Either thick, ox or buffalo hides are used for making leather for belts. Ox hides being of a close texture produce a better and more durable leather than buffalo hides, the texture of which is comparatively loose. But as ox hides of an adequate thickness are not available in this country buffalo hides are the chief raw material for making belts leather.

Spready and thick buffalo hides, the major portion of which may yield leather of about \(\frac{1}{2}\) inch thickness should be selected. The hides of female buffaloes are preferable to those of male animals, as the former are closer in texture and tougher in substance than the latter. Male buffalo hides produce a thick spongy leather which is decidedly inferior to the leather obtained from she-buffalo hides.

Whenever possible the hides should be brought from sources of collection in the wet-salted condition. In winter months there is little risk of putrefaction if the hides are well salted. But in summer putrefaction may set in during transit, specially in railway wagons which get very hot in the strong summer sun. Application of one or two coats of a 5 pet

cent solution of zinc chloride before solwill immensely improve the preserve the hides.

Dry and dry salted buffalo hide contain in the pack damaged hides putrefy either entirely or in places soak or lime liquor. Hence there is some uncertainty as to results, whistocks are handled. In India, the didry-salted goods cannot, however altogether avoided as bulk of the hides are preserved by dry or dicuring.

SOAKING

Green hides are washed in a standard changes of water to cleanse while dress dry-salted hides are soaked until the sufficiently soft. Either caustic soft sodium sulphide is used in the propert of 1 part of the former or 2 parts of latter for 1000 parts of the soak was The operation of soaking should be in pits and in drums, which will make hides rather too soft.

ROUNDING

Only the butt portion of hides of yield beltings of the required thickness strength. Hence soaked hides are rough into butt, bellies and shoulder. In rough ing care should be taken to cut out butt in such a way that there may not much wastage of leather in cutting strength for belts, while bellies and should (offal) are treated for vegetable tanns for making insole leather.

UNHAIRING AND LIMING

A sodium sulphide and lime paste made from 1 part sodium sulphide, parts lime and sufficient water to mathe mixture of a soupy consistency. To paste is applied on the flesh side of but

ich are then folded down the ridge and n again at the middle so as to make a it bundle. The pasted and folded butts kept overnight, and the following rning they are laid flat in a pit containfreshly made lime liquor. The butts handled once or twice in this lime and the day. They are taken out, unred, washed and fleshed. The fleshed to are then weighed. After weighing y are washed in pit at first in 2 or 3 nages of water and subsequently in a 1x solution for an hour using 1½ per t borax on the pelt weight in a sufficient t of water.

DELIMING

The well washed butts are now delim-Formerly deliming was done by bating i hen or pigeon dung in a pit or paddle now-a-days weak acids and synthetic ing materials are employed. According me method the butts are first bated by bling in the drum for about 2 hours in olution of synthetic bate peroly, pancor oropon. One pound of the bate per pounds of pelt may be used. When

have been delimed to the nt of one-third of their thickness on grain and flesh sides, the butts are nout and scudded. They are next ted with a solution of boric acid of the 2 per cent on the pelt weight should sed and the drumming continued until deliming takes place which should be rtained by the phenolphthalin tube, boric acid should be added in two lments.

According to another method the butts irst treated with 1 per cent acetic acid in hour, then they are bated with 1 cent pancreol, peroly, oropon or any synthetic enzyone bate for an hour, scudded. All the materials are oned on the pelt weight.

After full deliming the butts are ed.

PICKLING

The pickling is done in 1½ per cent Sulphuric Acid (sp. gr. 1.74) and 15 per cent salt on pelt weight. The butts are run in the pickle for about 3 hours. Then they are tanned.

Instead of acid and salt, pickling may be done with alum and salt using 6 per cent of each on the pelt weight and keeping them in pits overnight in the bath.

TANNING

Tanning may be done by either the double or single bath chrome process. The double bath process causes deposition of sulphur on the fibres, which is supposed to render the leather capable of withstanding the somewhat high temperature to which belts are raised, due to the mechanical action to which they are subjected. It is better than the leather tanned by the single bath method.

DOUBLE BATH PROCESS

In the Handbook of Tanning by Mr. B. M. Das the following process has been dealt with. Here the pickled goods are entered into the first or the chroming bath which may be prepared as under:—

Take on the pelt weight:-

Bichromate of soda	8	per	cent.
Sulphuric acid			
(sp. gr. 1.74)	31	**	,,
Common salt	8	**	

Dissolve these ingredients and prepare the bath with sufficient water to give the goods an ample float. Put the goods in this liquid for about 6 hours at the end of which cut a portion of a hide from its thickest part and see if the yellow colour of the chromic acid has penetrated completely into the hide. If it is yellow throughout the thickness of the hide, the chroming is over. If there be a white streak at the centre, the penetration of the chromic acid is still incomplete and the

period of coaking may be continued. The fully chromed butts are taken out of the pit and horsed up covering the pile with canvas or tarpaulin to protect them from the action of light which is injurious at this stage.

Next morning the reduction or the hypo bath is prepared in the following manner:—Dissolve in a tub 20 per cent hypo on the pelt weight and add the solution with sufficient water. Put in 8 per cent of salt on the pelt weight and stir well so as to dissolve the salt in the liquor.

In another tub dilute 5 per cent Sulphuric acid (sp. gr. 1.47) on the pelt weight with sufficient water.

. Add one-third of the dilute acid to the hypo liquor in the drum, stir up well and enter the goods. Close the mouth and run it half an hour, then add another one-third of the acid to the drum through the hollow axle while the drum is still rotating. After further one hour the last portion of the acid is put in and the drumming continued until the reduction is complete. This is ascertained by cutting a piece from the thickest portion of a butt. If the colour is blue throughout its entire thickness, all the chromic acid has been reduced to the basic chromic salt and the reduction is complete. If the cut shows a yellow streak, the process of drumming in hyposolution should be prolonged with further addition of hyposalt and acid if required. adding them in the proportion of 4 to 1.

After complete reduction has been effected a piece should be cut out from a butt and boiled for 5 minutes. If it does not shrink, tannage is thorough. If there be shrinkage, tanning is still deficient. Leather tanned by the double bath process does not always stand the boiling test, but it does not matter as very nice strong and durable belts are obtained from leather which does not satisfy the boiling test. If it is desired that the leather should stand

the boiling test, the pelt should be given further treatment with a quantity of single bath basic chrome liquor. The man be added to the reduction bath with taking the butts out of the drum, are indicated addition of the single bath liquor addition of the single bath liquor drumming should be continued until boiling test is satisfied.

The butts are then taken out in horsed up.

Another typical recipe follows:—
Bichromate of potash 2 per
Hydrochloric acid ½ ,,
Common salt 5 ,,
Reducing bath
upto 30 per cent Hyposulphite soda

Percentages are reckoned on "weight of the delimed pelt.

TANNING BY SINGLE BATH PROCESS

This may be carried out in the 1. .. manner. A very convenient plan is to the single bath chrome liquor to the passi both through the hollow axle and complet the tannage in this bath by adding whole quantity of the liquor in seven instalments as the tannage process. Towards the end of the process about to I per cent soda ash on the pelt we: should be dissolved and added to the di to increase the basicity of the liquor w a view to make the tannage thorough. I chrome liquor should be of basicity about 52:100 to start off with and increed to above 52:80 by adding soda as The proper quantity of soda ash to added would depend upon the acid prese In the pickle bath and the basicity of the stock chrome liquor and can only be form ed out by experience. The soda should be added in 2 or 3 portions either mixing with the last few instalments of the chrom liquor or after all the liquor has been pu in.

SAMMING AND SHAVING

The butts are then taken out and sed upto drain. They are sammed by ting through the samming machine or hanging up in the air. They are no wit and shaved to make the thickness on throughout. The shaved butts are tighed.

NEUTRALIZING

Neutralization follows shaving. st material to use for it is borax of which per cent on the shaved weight is ployed. About I per cent soda ash may o be used instead of borax. Soda ash atralizes more rapidly, but its action is ore drastic than that of borax. Conerable economy may be effected withdeteriorating the quality by neutralizthe surface first with about 4 per cent to ash and completing the neutralizan with 1 per cent borax. The butts ould be run in borax or soda until a ttion cut from a thick place of the ther shows on testing with blue litmus per that it is properly neutralized. ter adequate neutralization the goods washed in 3 changes of water at about C. The last wash water is run off and other butte subjected to are atment specially for belts.

Belting lenther need not be so pliable that for picking hand and must be abutely stretchless. On account of this : limited amount of grease is incorated into it, as grease makes the ther both pliable and stretchy. Some mers omit the fat, liquoring operation ngether. They stretch out the neutra-'d and sammed butts on stretching mes and coat the grain with a fairly k mineral oil. A thick lubricating oil y be used for the purpose. The flesh e is lightly coated either with dubbing de from tallow and fish oil or with a sture of degras and vaseline. The ring is effected slowly.

Others fat-liquor lightly. A fat-liquor made with 2 per cent. hard soap and 1 per cent. castor oil on the shaved weight of the leather may be used. After drumming slowly for thout an hour in the fat-liquor the butts are taken out and horsed up overnight. Next day they are slicked and nailed out on frames straining to the utmost extent to take as much of the stretch out of the leather as possible. The butts are dried out completely. They are then off the frames and put in damp sawdust overnight. They are then stacked and nailed out again on frames and dried out completely.

The butts are fluffed on the flesh side, rolled heavily, and french chalked on both grain and flesh.

Chrome belting leather is also sometimes stuffed with grease. The composition of grease determines the character of the leather as regards either firmness or pliability. A typical stuffing mixture is given by H. G. Crockete in his book "Practical Leather Manufacture," on page 131:—

Paraffin wax 40 parts.
Tallow or stearine 30 ...
Degras 30 ...

The leather after adequate samming preferably by a samming machine is stuffed in the hot air stuffing tumbler at a temperature of 50° to 60°C. The amount of the stuffing mixture used depends upon the pliability desired in the leather, 10 to 30 per cent in the weight of sammed leather may be employed.

After stuffing the butts are set out and hung up to dry partially. They are set out again tacked on boards and dried out completely. The butts are trimmed, rolled and brushed by machine. To remove stretch they are stretched out on stretching machines.

The leather is now ready for cutting into straps for machine belts.

-Construction of Fluorescent Lamp

FLUORESCENT lighting began with the discovery of the fluorescent powders giving white or nearly white light. Before the II World War, high voltage tubes were in use and experimental lamps working at mains voltage had been made. The war prevented the commercial development of these lowvoltage lamps. Since then rapid progress has been made.

The high efficiency of the lamps has been further increased, different colours introduced, a variety of sizes made, and large scale production set going.

Using far more materials than ordinary lamps, and calling for more elaborate processes, the lamps are nevertheless being made at the rate of thousands a day in a typical large factory.

Main components are the glass tube, the "scals" carrying the electrodefluorescent powder with which the inside of the tube is coated, and the gas filling. The glass tubes are made by automatic machinery and are delivered, cut to length, the tubes being dry cleaned internally before use in the factory. The various types of fluorescent powders are ground under carefully controlled conditions to obtain the desired particle sizes and mixed in a thin cream in nitro-cellulose, which serves as a binding medium. The quantities of powder and binder must be correct within narrow limits to ensure uniformity of coating thickness.

The glass tubes are held vertically over tanks holding the suspension, which is then forced up inside the tubes to the required level by means of compressed air, and in draining back leaves a film of sowder and binder adhering to the glass. After a short draining period the tubes are placed in a drying tower where they re-

main for some 30 minutes by which the fluorescent coating is adhering $k_{\rm dm}$ enough to the glass to prevent d the ment by further handling.

Frequent tests are made on the cosity of the fluorescent mixture. The important as any variation may affect adhesion of the powder to the tube the efficiency at which the lamp operate.

After the application of the content the tubes are stamped with the trade content and other relevant details and possible through a gas furnace in which we are heated to a temperature which decomposes and evaporates the broken leaving a thin dry coating of power adhering to the glass tube. As they emerge the quality of coating is checked Simultaneously with this check of the coating, the powder is buffed off the ends of the tubes to have them with exact length of coating required for executions.

At each end of the fluorescent land there is a cathode, consisting of a turn sten coiled—coil filament, and an anotherically which, according to lamp rating, citificates the form of a pair of metal plantached to the leading in wires, or is integral part of these wires.

The assemblies upon which the eletrodes are mounted follow the san general design as the airtight "pinch which is so familiar a part of an ordinar electric lamp. Current is carried to and from the electrodes by leading in wiremade in three parts—copper for the external contact to the cap, copper plated fickel iron for the airtight joint, nickel inside the lamp. Planged glass tubing provides a means for sealing this assembly to the bulb, and a smaller glass e allows the lamp to be exhausted and s filled at a later stage.

After these components of the "pinch" we been welded together on automatic achinery, the nickel lead wires are bent the light to the required shapes and the thodes clamped into position, anode ites where required being spot-welded extensions of the leads. The cathodes e then coated with electron emitting iterials, consisting of a mixture irim and strontium carbonates "binder." the ntrocellulose ing decomposed subsequently by pass-La small current through the electrodes.

The completed assemblies are then iced in the heads of a rotary machine coated glass tube is placed over each, means of gas jets the ends of each be are in turn joined to the flange of assembly and the surplus glass of the falls away. The lamps are now exusted, "closed" with pure mercury and ed with argon, this being carried out on liti-head automatic machines. The air removed in successive stages by an borate mercury vapour pump system ich produces an extremely high degree vacuum. During the exhausting pro-

cess, the lamps are subjected to a temperature of 480°C., this having the effect of driving from the glass any occluded gases, which are then removed by the pump. The coated cathodes are heated by the passing of a progressively increasing current and the gas so freed is likewise removed by the pumps, the flow of heat from the cathode will serve to activate the emissive coating.

The exhaust machine cycle concludes with introduction of a small quantity of argon and the sealing of the exhaust stem. The caps, which have previously been filled with cement, are placed in position and are firmly fixed by baking in the capping machine, the lead-in wires being subsequently soldered to the cap terminals.

The lamps, now complete, proceed to the ageing rack where current is applied for about 30 minutes to stabilise the ready for use. They are then subjected to a thorough test for general overall efficiency before being packed and put into stock ready for transport.

The table giving below types which nave been standardised by several leading manufacturers:—

PLOURESCENT LAMP DATA

Lamp Rating (Watts)	Lamp Running Current (Amps.)	Choke Loss (Watts)	Nominal overall Length (Ins.)	Bulb Diameter (Ins.)	Average Life (Hours)	Light output Daylight and Warm White		Natural
80	0.85	20	60	11	3.000	3.040	B.C.	2710
40	0.41	12	48	11	2,500	1,720	Bi-pin	1520
30	0.34	10	36	1	2.500	1,200	Bi-pin	1080
40	0.85	20	24	11	2,500	1,160	Bi-pin	1040
20	0.35	12	24	14	2,500	620	Bi-pin	560
15	0.30	10	18	1	2,500	420	Bi-pin	375

LAMPS FOR A LIVING ROOM (175-200 m...fl.)

Type of Lighting Fitting.		Number and size of Fluorescent Lange
General Diffusing	•	2-30 Watt (3-11)
General Distances	804-07	Z-40 Watt (2-11.)
	\$milders.	4-20 Watt (2-ft.)
	******	6-15 Watt (18-in.)
Mainly	era 19	3-30 Watt (3-ft.)
Indirect		Combination of
443444 444	*** *	2-40 Watt (2-ft.) a";
		2-20 Watt (2-ft.)

A possible cause of complaint among users is that of choke harm. Even with good quality components there is sometimes a disturbance which can be detected by those possessing good hearing. One cure is to locate the choke in a remote position and a further precaution is to arrange for insulated mounting.

Sometimes there is dissatisfaction due to flicker from the ends of the fluorescent lamp becoming noticeable in the "corner of the eye," producing visual disturbance when one is not looking directly at the lamps. The solution is to see that fittings are designed to shield the ends of the lamps.

The general tendency is to design fluorescent lighting fittings so as to accommodate the choke and condenser, provision being made for adequate ventilation and protection against mechanical damage. If there are instances where this is not done, the auxiliary gear, if located within 12 ins. vertically and 6 ins. in any other diretion of soft good or other combustible material, should be enclosed in a fireproof housing.

With regard to power factor, it is sometimes found more economical in large installations, to arrange for multiple correction of a bank of fluorescent lamps rather than correct each individual lamp. If the former method is adopted the installation must be such that a power-factor condenser of suitable capacity is inserted across the mains in each portion

of the sub-circuit controlled by a separation switch.

On the subject of switching, it fact that some types of switches or specifically designed to break in indext load at full rating. If used to complicate the same through the steady current they normally contribute the steady current they not contribute the steady current t

Similarly circuit wiring should not rated to carry merely the nominal stead current. The known or measured curre should be multiplied by the factor 1. If the current cannot easily be measure and providing the power factor is corrected to 0.85 or better, it is, permissible calculate the circuit rating by multiply lamp wattage by two and dividing mains voltage. Where the circuit including standard lamps, the extra current these is obtained simply by dividing has watts by main voltage.

A most important precaution, often overlooked, is to ensure that exposed metalwork shall be earthed a fittings should be provided with earthing terminals accordingly. Although fluorescent lamps may be operated on I mains, this involves certain complicate in wiring and switching and in any operformance is not upto the standard that on AC. If, however, the circumstances are such that motor generators convertors are employed for the provise of the requisite AC, the circuit should earthed to one terminal of the generator convertor.

-TASAR SILK.

By Benode Behari Thakur.

ASAR (Kosa or Koushik Bastra) is indigenously known throughout the ntry and was perhaps one of the oldest ural gift of occupations to a number people. Besides the luxury value athed to silk, a symbolic and sacred imrtance is attached to it by the Hindus. d it is that refers to the Kshoumabastra Manusamhita and Rigveda. To many opla as yet, in the country side in the eart of India, the use of silkcloth as attahastras is as yet served by Kosa oth and they know very little of the sperior silk of mulberry variety. Tasar grown by a kind of silkworms (Anthea Myllitta) more prone to natural condions, on different kinds of trees in the pen generally in the forests. They row in the wild and semidomesticated tate, commonly on Asan. Sai. Yen Terminalia Tomentosa) Sal (Shorea obusta) and also sometimes on Termialia arjuna, Zizyphus Jujubaer (Kul or acr) trees. The forest area of Central rovinces and Berar, Behar and Orissa ind Hyderabad (Deccan) and as Bengal which once included the districts of hinghhum, Manbhum, and Santhal Pararas, Ranchi, Hazarıbagh and Moyurhan State produced ample quantities of Takar, so much so that after a major porion of half of the annual production of Tax ir silk, were used by the weavers of Bankura, Birbhum, Burdwan, Hooghly and Midnapore, quite a good quantity of ay 2.25,000 lbs. of Tasar reled in the actories of M/s. Louis Paven & Co., at their Murshidabad Factories, used to be exported to France annually. 5.000 families of weavers consisting of bout 20,000 people of the districts now n West Bengal, depended on Tasar

spinning and weaving. Bengal Tasar as such had a good name, in the foreign market.

Even today, India, exported mostly through the Calcutta Port, the following quantities of Tasar waste to abroad at rates very liberal.

Year.		fbs.	Approximate Value Rs.
1942-43		3.40.000	6.50.000
1943-44	****	89.000	1,00,000
1944-45	** **	40,000	1,70,000
1945-46		1,15,000	1,50,000

*The figures are exclusive of exports of mulberry-silk-waste.

Though at present, the production of Tasar cocoons within the areas of West Bengal might be negligible, a fair quantity of Tasar would be in demand by the weavers of the districts mentioned above. They could get their Tasar yarn or cocoons from the neighbouring districts of Behar mostly and portions from Orissa and Central Provinces. This demonstrates that though the area of production of Tasar in Bengal might be negligible, production of Tasar yarn within the areas of West Bengal, and exports of Tasar wastes through Bengal, still take a prominent part.

PRODUCTION OF TASAR COCOONS

Production of Tasar cocoons no doubt provides a good subsidiary occupation with less or no cost, but the nature of privations, the rearers have to undergo, as dictated by nature, customs and religion, coupled with the difficulties on restrictions in using forest areas and ferest plants and also degeneracy of worms; have made the industry reduced. And the rearers are now more inclined to raise

only the yielding crops in Autumn, the seed crops and other catch crops being ignored, by the general rearers. The successful seed crop growers make no doubt a good profit by selling seed co-coons at 10 to 15 cocoons per rupee and sometimes at more costs.

REELING OR SPINNING

The quality and size of different varieties of cocoons as grown in different localities, and conditions, on different varieties of trees, vary. Such cocoons are sold on different trade and local names, such as Naryah, Mudhya, Dabha, Jadui, Bugut etc. The quality, lustre and other physical properties; with regard to strength, elongaion etc. also vary.

The cocoons are softened by a crude method with country ingredients, and are reeled in 3 or 4 filaments drawn together from 3 or 4 cocoons on to a simple Natwa worked by right hand, while the individual threads are given a physical twist to make them adhere together, on the left thigh of the reeler with left hand. The rendita of Tasar cocoons according to the quality and size of the cocoons vary from 50 to 120 Tolas per 100. Equal quantity of waste, besides the peduncles or stems of the cocoons which also contains silk content in stiff condition, is obtained. The waste of Tasar is disposed off at a very cheap cost of say -/2/- to -/4/- per lb. The peduncles are thrown away.

QUALITY

Unlike Mulberry cocoons, the Tasar cocoons possess a peduncle at the head to the mouth of the cocoons which support on the twigs of the trees. After the cocoons are softened, this gets loose and render unsuitable to reel in one continuous flament on sinking method in a Reeling pan. Attempts were however made sometimes to overcome this but no

successful effort of economic imports is on records. Tasar fibre are striated do not adhere together stickily. quality and other properties are no de very satisfactory, and it is that the ... are made good use of by feet machinery is spinning into suitable The one single filament gives a rest length of about 1500 ft. and is so if that the titre of the filament is menat 10 to 15 deniers and gives a stresof minimum 1.6 to 2.5 gramme denier and an Elongation of about 22 ... per cent. Some authorities, recorded in past for some quality of the cocoons give an Elongation of as much as 30 per cent, which is of course a matter observation with precision for available cocoons of different qualities. The spr fic gravity of Tasar yarn is 1.250 w the mulberry gives 1.329. Better real process or methods to obtain unife quality of silk, if possibly explored, we have therefore given one of the best petus to the Tasar production to a sta of whatever condition it still exists. the past attempts, no improvement reeling was called for and the syst prevalent in the Sambalpur districts of in Orissa, seemed to serve the purpa very well for that time. Improvement seeds, checking the degeneracy of work exchange of seeds and possible assistant to the Tasar growers by alloting suital forests; were taken to be the in criterion. This project with ends in vic as may be working in some of the Togrowing province in Chaibassa in Beli and one at Armori in C. P., might doubt help in surviving of the producta of Tasar cocoons. But when the yields or economic production of anything ul mately interlaces with the remuneration the better quality of the material or six would no doubt render its good share yield. Having fair degree of composit

e qualities and physical properties of Tasar if economically used for such r better utility purposes, may have red a better intrinsic value. Silk is d in various purpose other than utility in clothing as luxury goods. physical properties and chemical position of silkmulberry silk are as h that renders their use in manufacture various articles of men's needs. Silk I silk components play an important e in the sinews of war for use in Para-Cartridge bags. Indulators. tgical articles, Ligature from guts, etc. k and the body fluid of the worms are v rich in Carbon content. In Japan, ive Carbon are produced from the stes of Silkworms. Fine pupae oil is duced from the pupae inside the cons. The oil further refined by ben-1 process is used as sauce and for jufacture of soaps. Aminoglyceric Lis produced from sericine or gum tent. Owing to the inherent common culties, it may of course go difficult to lore possible and easy ways of utility erve immediate economic gain similary lasar or on wild worms before it passes such experimental or rather Laborar stages. Owing to variations in the abution of micellaes in the structure he Tasar filaments, it has been observthat suitable ligature nuts can not be fined from the silk glands of the Tasar ms. Similarly corresponding defects rent may discourage for use in other iches also. But the purpose of ider utility in improving the quality of ar yarn and manufacture of spunsilk 1 Tasar waste in the country, may no of be visualised to be an effective atit after they are perused with care. ol-like fibres can be dermed by treat-I with detergents made from sullated higher alchels and a further ment in aqueous Potassium

chromate and Aluminium chloride with a subsequent immersion in a solution of cow-hair, pig-bristles or feathers in hot strong alkali.

ATTEMPTS MADE AND POSSIBLE EFFECTS

Tastes and fashion have by now changed from lustre to quality. Fabrics from twisted tasar yarn still finds a good favour among the consumers. A rational mechanical shaping attempt in spinning processes may however be help-The writer had the opportunity to come across a few samples of Tasar spun silk turned out in the Mysore Spun Silk Mills Ltd., from the wastes of Bilashpur district in C. P. Quality of the yarns seemed to be promising. If the wastes of Tasar which contain good amount of silk content be utilised on economic units, the considerable quantities of exportable Tasar wastes, which as illustrated in above (compiled from the D. G. C. I. S-Statistical Abstracts) accrues very little and nominal costs would no doubt vield a good return to the industry and implement the intrinsic side of the industry.

Evidently the relative yield thus casts valuable bearing on the employment of the rearers in raising of their crops, irrespective of the natural conditions and quality of the cocoons produced in each season, which may vary in number and in weight, in relation of 128 (Bara-muga) to 600 (inferior) cocoonshells in a pound. Average quantity of Dabha variety of Behar weighs 250 to 300 shells in a pound. Naturally amount of waste in relation to labour which is more high in case of reeling or spinning from smaller cocoons, is also more. The utility in weaving and the economic production of varn from the Tasar cocoons should, therefore, on the other hand, attach a great importance for successful efforts.

OR MULBERRY VARIETY

On an analogy with the silkworms of mulberry variety, the programmes suggested by Mr. N. G. Mukherjea, the then Assistant Director of Agriculture, during the year 1905, given in the following were worked in the past. This proved to be a failure, except to render an encouragement to the local rearers in continuing their work.

PROCRAMME:—(a) Establishment of Tasar rearing Nurseries, where rational methods of propagation of trees and reeling be taught and where ample quantities of bonafide wild and semi-domesticated seedcocoons will be distributed.

- (b) The propagation of Asan or saj
 - (c) Reservation of forest trees.
 - (d) Exchange of seeds.

As stated above, the Tasar stations working in Behar and in C.P., with the present sub-vention, though on the lines of the past attempts with experiences thereof, may successfully render some help to the industry. But attempts of utilising Tasar for better purposes or for better qualities, may further benefit the manu-

facturing interests, i.e. Tasar spinner and weavers concerned. This will extend its return to the interests even in the non existents with relatively a better yield amoutlay. Utilization of Tasar in spinning mills in India also will directly help i running of economic units of Spun Sil Mills.

ACRNOWLEDGMENTS

I am thankful to Mr. B. B. Roy Officer-in-Charge (now Superintendent Bengal Silk Conditioning house for hi encouragement in testing certain proper ties of Tasar and to Dr. Paranipe, well known Physician and Surgeon of Maha Nagpur for his courteous undertaking of preparation of ligature guts and experi ments for their surgical use, when I wa working in the Central Provinces. 1 Direct-twist process on Tasar has furthe been tried in the Bengal Silk Condition ing House, which seemed to fairly rende a Laboratory success to the effort. tinuance of such efforts on tangible limit and a co-ordination with research at th Centre, might be of good value for thi ignored industry and to those-alread working on the liberal lines in th industry.

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-The Cashew Nut: Its Utilisatio

IN most parts of the tropics the cashew is esteemed as a dessert nut and in recent years it has become much better known in the European countries and ILS.A. This nut is indigenous in Brazil, but is now widely distributed and naturalized throughout the warmer parts of the globe. In the coastal areas of South-West India the tree is planted by the Portuguese in the 16th century from where the commercial supplies of the nut are mainly derived at the present time,

The tree yielding the cashew nut may reach a height of 40 feet, but is often considerably smaller, especially when exgosed to strong winds, as is the case near the sea, when not infrequently it adopts a low-spreading habit with a gnarled or twisted trunk. It will grow under a wide range of climatic and soil conditions, often succeeding where few other trees or crops will grow, for instance in poor sandy soil or where rainfall is meagre. However, it is at a low elevations in the tropics, not far distant from the sea, where it thrives best and gives the greatest yield of nuts. On account of its ability to grow under adverse conditions it has been used in planting up waste areas and for checking erosion.

In planting cashew trees it is usual to sow the seeds in situ at distances of to 40 feet apart. Germination takes place in 8 to 10 days and under favourable conditions growth is rapid, young trees sometimes flowering after 18 months. Young trees may first be raised in nurseries, but they do not always transplant easily owing to the presence of a long tap-root. However, this method is to be preferred when the cotyledons or succulent primary leaves of the seedlings are liable to be eaten in the field by rats or even small herd-boys.

Usually 5 to 6 years elapse before economic returns can be expected. A f average yearly yield of nuts from a mati tree is reckoned to be about 20 poun approximately 30 per cent of which wot be kernels, although well-grown vigore trees may yield 100 pounds or more. N ripen two months from flowering and i usually left to fall from the trees before being gathered. Although a tree m flower freely, profuse shedding of 1 flowers may take place and only a f nuts mature. This is often the case cloudy weather, although it is believ it may be a vertical characteristic to so. extent.

The cashew tree is evergreen we rather tough leathery leaves, and flow borne in clusters at the end of the branches. These develop into handsong ally-coloured fruits consisting of a pershaped, swollen basal portion (or pedicly which is succulent and juicy and brighted yellow or orange in colour. It is edily and commonly known as the "cash apple", owing perhaps to its superficate resemblance to a somewhat overripe app. Attached to the end of the "apple" is to cashew nut itself; olive in colour and sembling a large kidney bean. In the centre of it is the kernel.

The shell of the nut is not undithard or woody, but contains an activities that acts as a powerful vesicant a burns the skin in much the same way strong carbolic acid. To the unwa attempting to bite open the nut with a teeth severe blistering of the lip is like result. The irritant oil or juice may expelled by heat by hand without risk severe injury. Roasting also improves a flavour of the kernel and for these reasc

the nuts are always roasted before the agencle are extracted.

Various methods of roasting the nuts are employed in different countries. Whichever method is used great care has to be exercised to prevent over-roasting which results in a charred or discoloured, inferior kernel. One method is to place the nuts in hot sand. A common method practised by peasants in India is to place the nuts, about 6 pounds at a time, in a pan over a fire for a few minutes, stirring all the time to prevent charring. After roasting the nuts are sprinkled with wood ashes so that the pungent oil adhering to them does not harm the hands when they are cracked. Sometimes open earthenware pots 'are used, perforated to allow the shell oil to escape. In the factories that have been established in India, largescale methods of roasting have been This is done by feeding adopted. the nuts into perforated rotary drums which are inclined over fires fuelled with the cashew shells. When the nuts come out at the other end of the drum roasting is complete. Soaking the nuts in water overnight is found to reduce the likelihood of charring with this method. The oily smoke and acrid smell of the burning shells have an unpleasant effect on the nose and eyes of unseasoned visitors. As the fumes are so acrid, factories are often situated well away from residential areas.

The extraction of the kernels from the roasted nuts is done by hand, for no machine has yet been devised that will perform this operation in a satisfactory manner without a good deal of breakage of the kernels. In the factories in India this work is performed for the most part by women and girls who squat on the ground, each with a wooden baton and a flat stone embedded in the ground in front of her. Cracking the nuts is a task that demands great skill. Speed is an import-

ant consideration and it is very easy break the kernel if too much force is used Sometimes a piece of hooked wire is us: to help extract the kernel. The thin ligh brown or yellow skin which covers th kernels is easily removed by hand aft. the kernels have been placed for a hour in drying-chambers. This dryin makes the kernels very brittle and easil removed by hand after the kernels have been placed for a few hours in dryin This drying makes th channeleers. kernels very brittle and easily broke They are therefore spread out to absor a certain amount of moisture or placed i "sweating-chambers" before being grac ed according to size and finally packe for export. They are usually packed i 2 5-pound tins from which the air is ex tracted before being hermetically sealed This method of packing prevents rancid ty or insect attack and kernels packed i this way have been found to show n deterioration, even after twelve month.

In grading, which is also done be female labour, the usual grades for kennels are: (1) "wholes." (2) "halves, (3) "brokens," and (4) "rejects of spoilts" (including charred kernels) Only the first two of these grades are usually exported and "whole" kernel fetch much higher prices than "halves. Broken kernels are frequently utilized locally, and the rejects and "skins" whice contain fragments of kernel for feeding poultry.

There are differences in the qualitand the size of kernels from differen areas. Good kernels are pure white plump, not twisted, fairly hard and with a fair degree of sweetness. From som districts the kernels may be small or tohard and fibrous to be rated as firs quality. The kidney-shaped kernels are generally consumed as "salted nuts" or substituted for almonds with which they compare very favourably. Uses have also been found for them in the manufacture of confectionery and sweetmeats of various kinds. The kernels have a pleasant, bland taste, and are slightly sweet. Some people use them in their own special dishes in a variety of ways in curries or stews, eaten with jaggery (palm gur) and coconut, or mixed with bean flour and fried in oil. Sometimes they are fried in coconut oil before eating.

In addition to the cashew nut the tree provides a number of useful products for the inhabitants of the countries where it occurs. The wood is useful for fuel and for charcoal, but is usually of unsuitable dimensions for other purposes. The acrid hell oil owes its blistering action to the presence of cardole and has various medicinal uses, especially in India. In European medicine it has also been used in preparations for removing worts and corns. Other uses are for treating fishingnets and woodwork to prevent attack by termites or "white ants". In controlling mosquito larvae it has been found that this oil added to paraffin greatly increases the toxicity of the film. In recent years it has heen used in the manufacture of plastics, and for certain sorts of paint such as are used for ships' keels, for cement surfac or where corrosive influences preclude the use of ordinary paint.

The cashew "apple" or succulent bas part of the fruit may be eaten out of han but is rather tart or astringent as a rul and somewhat fibrous or stringy. Th juice extracted from it provides a refresl ing drink or it may be fermented and wine resembling Madeira prepared fro it, also spirit. It is extensively used "cajuda" made from it is a popular bev rage. In fact the Brazilians are said to 1 the only people who fully appreciate tl cashew. They have varietal names for those trees that produce the largest at finest fruits and utilize the "apple" pe haps more than the nut itself. It is common sight in parts of Brazil to se huge heaps of the "apples" piled up the markets when they are in seaso Vinegar has also been made from the juice. In Goa spirit is regularly distille under Government control, from the fe mented juice of these fruits. Distillation is also carried out in Portuguese Ea Africa, where at one time natives in certain area became so partial to it th it was said of them: "During the cashe season they give themselves up to the favourite beverage and become perfect useless".

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4

-Canning and Preserving with Honey.

HONEY may be used in place of all or a part of the sugar used in canning, jelly making, preserving, and pickling. The milder flavoured honeys are probably most compatible with the less tart fruits for making sauces and jellies. The stronger flavoured honeys, particularly those with a spicy flavour, are excellent for pickling purposes and conserves made from tart fruits like gooseberries and rhubarb.

It is somewhat difficult to designate special honeys for special fruits as taste preferences vary. A home maker can best determine her family's preference by experimenting some. All honeys are good but not all flavours of honey are equally as pleasing to all individuals.

An all-honey syrup is naturally darker than a sugar syrup. Such a syrup tends to darken the lighter coloured fruits as peaches and pears when canned for sauce. However, the original fruit flavour is intensified. If one prefers a lesser degree of the original flavour of the fruit, it is better to replace only from one-fourth to one-half of the sugar ordinarily used with the honey.

In using honey, two precaution should be obtained:

- 1. Since honey has a tendency to foam considerably when heated, there is some danger of the product "cooking over" at the beginning of the cooking period if a large enough preserving kettle is not used or the syrup carefully watched
- 2. Since honey is part water, it is necessary to cook the product in which it is used slightly longer in order to obtain the desired consistency.

HONEY IN SAUCES

For the syrup—Bring water to boiling point. Add the honey and stir. Agair let come to a good rolling boil. Remove all scum.

Canning by Cold Pack Method—Pour the boiling syrup over the fruit which has been packed in sterilized jars. Process according to standard schedule canning by hot pack method Add fruit to boiling syrup. Allow to come to a good rolling boil. Fill sterilized jars Process according to standard schedule. The following proportions of honey or honey and sugar to fruit for the various sauces are appended beliw:—

Fruit	All Honey	Syrup. Honey and Sugar		
Cherries (tart)	2 cups honey	1 cup honey		
Plums (tart)	33 cups water	1 cup sugar		
Apples (tart)		4 cup water		
Strawberries				
Pineapples	1 cup honey	1 cup honey		
Raspberries	2 cups water	½ cup sugtr		
Peaches	•	2½ cups water		
Sweet black cherries				

Be sure to remove all scum from the syrup before pouring over the fruit in jars or adding the fruit if the hot pack method is used.

Jams and Jellies

Crab-apple, apple, plum, quince, and currant jellies can be successfully made by using \{\frac{1}{2}} cup honey to 1 cup of juice or \frac{1}{2} cup honey and half sugar may be used.

ALL-HONEY—Boil jellies 10 minutes. Add honey and cook to 220°F. Remove cum. Pour in hot sterilized glasses. Cover with parafin.

Honey and Sugar—Boil in Juice 10 minutes. Add sugar and bring to boiling point. Add honey and cook to 200°F. Remove scum. Pour in hot glasses and over with paraffin.

HONEY JELLY

2½ cups honey, ½ bottle liquid fruit pectin. Mix honey and water in preserving kettle. Bring to full boil as quickly as possible. Add liquid pectin stirring constantly. Bring to full rolling boil. Remove from fire at once and skim. Quickly pour into hot glasses. Cover with paraffin.

STRAWBERRY JELLY

1½ quarts fully ripe berries, 4 cups honey, 3 cups juice, ½ bottle liquid pectin. Crush the ripe berries. Squeeze out juice. Drip through cotton flannel for sparkling product. Measure 4 cups honey and 3 cups juice in preserving kettle. Stir, bring to boil. Add the pectin, stirring constantly. Bring again to full rolling boil and allow to boil for 20 seconds. Remove from fire, let stand 1 minute, skim. Pour quickly into hot glasses. Cover at once with paraffin.

CHERRY JELLY

2 quarts of juice, 1 quart of honey. Crush cherries. Cook slowly without water till tender. Drip through cotton flannel. Measure 1 quart of honey to 2 quarts of juice. Boil until it double drops from the spoon. Remove scur pour into hot glasses. Cover will paraffin.

PEACH JAM

3 pounds peaches, 2 cups honey, teaspoon allspices, 1½ teaspoons who cloves, 3 teaspoons broken stick cinns mon, 3 tablespoonfuls of lemon juice, cup peach juice. Put spices in cheeseclot sack. Cook slowly all ingredients until c desired consistency. Remove bag c spices. Place in sterilized jars an paraffin.

PRESERVES

The following are the principal preserves prepared with honey:—

SUNSHINE PRESERVES

Allow 1 pound of honey for ever pound of fresh fruit. Mix and spread o platters. Place platters in box slightly higher at back than front. Cover with glass. Place in sunshine on a bench When preserves are thick, put in sterilizer jars and seal.

APPLE BUTTER

2 quarts cooking apples, ½ teaspoor ground cinnamon; pinch allspice, 1 pin honey (1½ lbs. or 2 cups), 1 tablespoonfulemon juice, 1 pint vinegar. Cook slowly several hours. Stir frequently to preven sticking and scorching. When thick, cai in sterilized jars. Paraffin and seal.

GINGER PEARS

Wash, pare, core and cut into very thin slices hard under ripe pears. Allow 4 pounds honey to 4 pounds pear slices Add ½ cup water. 1 ounce ginger cut into small pieces, 2 lemons using the rind (Cu in very thin strips.) Simmer all ingredients very slowly. When thick as marmalade seal in hot sterilized jars.

PINEAPPLE WATER MELON PRESERVES

1 pound honey, 2 cup water, 1 teaspoon salt, juice of 1 lemon, rind of 3 lemon, 3 teaspoon ginger, 5 pound water

metion rind cut into small cubes. Simmet pently for 3 hours. Add 1 cup crushed pineapple. Cook 1 hour longer. Seal in sterilized jars.

ORANGE MARMALADE

3 medium size oranges, 2 cups honey (2 sups honey makes a heavy sweet marmalade-14 cups honey not quite so sweet), 1 cup water, 6 tablespoonfuls lemon juice, 4 cup liquid fruit pectin. Run oranges through food chopper. Measure and you should have from 13 to scant 2 cups ground orange (skin, pulp, and all). Add water, simmer 15 minutes after it has come to good boil. honey, bring to a boil, then simmer 30 minutes. Add lemon juice. Add liquid pectin. Bring to full rolling boil and allow to boil 30 seconds. Remove from fire, skin by turns for about 5 minutes. This slight cooling should prevent floating fruit. Pour quickly in sterilized glasses. Paraffin at once.

PICKLES

Apple, peach and pear pickles are prepared thus:—3 cups honey. 3 cups vinegar, 2 cups water and 1 teaspoon salt. Bring these ingredients to a boil. Add fruit and cook till tender. Pack in sterilized jars and seal. For apples tie the spices in cheesecloth sack and boil in pickling syrup. For pears and peaches stick the whole cloves in the fruit and allow stick cinnamon to cook in the pickling syrup. Spices referred above consist of cloves and cinnamon. 2 to 3 whole cloves to each pear or peach, depending upon size of the fruit.

CHUTNEY SAUCE

2 onions, 1 green pepper, ½ cut hot red pepper, 3 green tomatoes, 2 tart apples, 1 cup raisins. 3 cups crushed pineapple, ½ cup vinegar, ½ teaspoon ginger, 2 tablespoons salt, 2 tablespoons mustard powder, pinch of red pepper, 1 cup honey, juice of 1 lemon. Run through food

chopper the first six ingredients. the other ingredients and simmer sl for 2½ hours. Pack in jars and seal,

CUCUMBER PICKLES

2 quarts cucumber, \(\frac{1}{4}\) teaspoon cimon, \(\frac{1}{8}\) teaspoon allspice, 2 cups he 1 teaspoon celery seed. Mix spices, gar and honey. Let come to a boil, over cucumbers and seal.

CAULIPLOWER PICKLES

Remove outside leave and stalks, wash cauliflower thoroughly Break small flowerists. Cook in boiling so water for 12 minutes. Rinse in cold v Pack pieces in hot sterilized jars. Fil jars with honey spiced vinegar prep as follows:—1 quart vinegar, ½ honey, 1 stick cinnamon, 1 teaspelery seed, 2 small onions sliced, 1 spoon whole cloves, 1 teaspoon alls Boil this mixture 15 to 20 minutes. So and it is ready for pouring over a flower. Seal so while hot.

HONEY VINEGAR

There are various recipes for vin making but the following two have I found to be good.

T

2 lbs. of honey, 1 gallon of war Dilute honey with part of the water then heat to 200°F. Scald the barre crock in which vinegar is to be made and provided honey and add the remainst the series of th

TI

1 qart of honey, 8 quarts water, 1 cogether, Allow mixture to stand in warm places until fermentation cea Seal in clean jars.

-PLYWOOD: A GROWING INDUSTRY.

By S. K. CHOUDHURI.,

DLYWOOD is an industry born of the modern demand for the maximum of courty, utility and strength. It is difficult to give a comprehensive list of all the to which Plywood is put. In one cord, it covers almost every phase of todern life.

Modern interior decorations of large is h veneer surfaces employing beautiall and valuable timber has been made assible only by the application of constition. The modern furniture with its isgance, strength and efficiency owes to large extent to the use of Plywood or minated panels. Plywood has been uninly used whenever lightness, and trength of construction are required.

The use of plywood and laminated oards has become so extensive that they re practically used in aircrafts, ship-nilding, prefabricated houses, interior onstructions, such as walls, ceilings, cors, etc. and from day to day the uses which it is being put is increasing.

The recent research that has been oing on in various parts of the world th adhesives for bounding plywood have cen so great that to-day it is possible to anufacture plywood not only for interior es but also for exterior purposes like ulding of aeroplanes, prefabricated ouses, exterior doors, etc., in unlimited nantities. This has been possible due to te modern synthetic resin adhesives that re water-proof, boilproof, and fungusoof. The uses of plywood in decorative novations are mural panels in the form pictures made entirely from inlays of neers out from different varieties of nber.

Though plywood as it is known today a recent product there are evidences of

the existence of 'veneering' dating back from 1500 B.C. The term "veneer" denoting a thin sheet of layer cut from wood. has also been traced to ancient Rome and Greece. In its simplest form, Plywood consists of three layers of thin wood firmly glued together with the grain directions of the middle layer at right angles to that of the two paralled outer lavers. Laminated Board can be said as a recent development of plywood. In principle it is based on the same idea. Like plywood it is built up of layers of thin wood glued together. The essential difference is that thicker lavers are used for cores for laminated boards than for plywood. It is now being more and widely realised that furniture or other panels constructed from plywood or laminated board are actually superior to similar articles made of solid timber.

In India the main outlet for the plywood industry is demand for tea chests. The quality of the Indian-made plywood is, therefore, judged by the suitability for the manufacture of tea chests. The essential requirements of the tea chests are:—

(a) The wood must not impart any taint to the tea, (b) it must be free from termite and borer infection, (c) the plywood must be strong and at the same time not heavy, and (d) it must be properly dried and glued with an approved cement in order to withstand deterioration in a tropical climate. According to the Indian Tariff Board Report (1947), the tea gardens complained very bitterly about the poor quality of the Indian tea chests, and also during the war period complaints were received from the Food Ministry in England that tea packed in Indian-made tea chests suffered considerable damage

and wastage on account of the defective quality of the tea chests. "When this complaint was investigated by the Forest Research Institute at Dehra Dun, it was found to be substantially correct. Two of the well-established factories have no doubt produced acceptable qualities while the majority of the factories have not satisfied the consumers on the point of quality. There is every reason to hope that the Indian factories can produce an acceptable quality if proper specifications are prescribed and the obligations are imposed upon the manufacturers to conform to those specifications," adds the rport.

With the development of the export trade in tea, India had to import in the past on a large scale, plywood from Europe for the purpose of making them tea chests. Until the outbreak of World War I, India had to depend entirely on foreign imports of plywood for making chests. The difficulties in the supply position caused by the cessation of imports of plywood during the World War I encouraged some enterprising firms to start a few factories for manufacturing plywood in the country. In 1917, at the request of Indian Munitions Board the Surma Valley Saw Mills undertook the manufacture of plywood, and in 1918 the Assam Saw Mills and Timber Co., was floated. This company got a 30-year lease for extracting timber from the north-etst frontier tracts. The real pioneers in the establishment of the plywood industry in India are the Assam Saw Mills and Timber Co., and the Assam Railways & Trading Co. Both these factories are located in Assam where suitable timber for tea chests is easily accessible. Assam being the largest producer of tea in India, these factories have also the advantages of the aciahbouring markets for the tea chests. These factories started production between 1920, and 1924. The indigenous

industry had, however, to face seric competition from foreign manufacture and had to apply to Government for pi tection. There was a tariff inquiry 1927 but the recommendations of Tariff Board for the protection of the dustry were not accepted by the Gover ment. The revenue duty was raised i931 from 8 per cent to 10 per cent. (account of the keen foreign competitie the industry had to face difficult tim during the period 1930-39 and could r make much headway. In 1938 there we only three factories in existence, two which were in Assam and the third Kallai in South India. Just before t commencement of the second World Wa four or five new factories came into ex tence, the most important amongst the being the Plywood Products, Sitapi The great expansion in the industr however, took place during the Wor War II when the number of factories, b or small, rose to about 80.

Accepting most of the recommend tions of the Indian Tariff Board last ye in regard to the continuance of Protection to the plywood and Tea-chest Industry the Government have accorded the Industry continuance of the protection for years.

It is no doubt a happy sign; but muc more has got to be done. The recommendations requesting the Forest Research Institute, Dehra Dun, to carry on research new adhesives should also be give a top-priority, so that the industry is no compelled to depend on casein alone for its glueing purposes.

The recommendation of the India Tariff Board (1950) for the setting up or regional testing laboratories in Calcutt Assam, the Southern India, was mo welcome to the industry and attempt mube made to collect funds for the purpose both by the Government as well as he

acse engaged in the manufacture of ply- dations to be side-tracked by interested good in this country. The recommendaous of the Tariff Board if properly imnem left to allow the present recommen-

NAME OF THE

parties and this essential industry will be in a position to prosper in no time and lemented. Government would have no India will soon be made self-sufficient in her requirements of tea-chests.

FOR STUDENTS AND BUSINESS MEN

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-TEST FOR MINERAL OILS.

mineral oil in vegetable oils attempts have been made to study a method which might prove handy for detecting the presence of the adulterant in the commonly equipped school laboratories and hospitals. The Director of Indian Agricultural Research Institute, Delhi has suggested the following test, which would enable mineral oil to be detected upto even 1% in vegetable oils:—

MOLDE'S RAPID TEST FOR MINERAL OILS

Dissolve a piece of sodium hydroxide, the size of a pea in a large test tube of 100 C.C. Erlenmyer flask in a few drops of water and add 15 c.c. of absolute alcohol. To this solution add ten drops of the sample to be tested and boil vigorously for two minutes being certain that no unreacted oil remains on the sides of the tube or flask. Then add 50 C.C. of hot distilled water, a slight turbidity indicates the presence of mineral oil.

This test may slightly be modified to make it more handy. Instead of the large test tube of 100 C.C. Erlenmyer flask, a test tube ("6×3") may be employed and 5 drops of the sample 7 C.C. of absolute alcohol and 20-25 C.C. of hot distilled water may be used in place of 10 drops of the sample, 15 c.c. absolute alcohol and 50 c.c. of hot distilled water. The test tube should be of heat resistant glass, the heating should be done with an air condenser. The absolute alcohol should be pure and give no turbidity with distilled water.

A air idea of the degree of adulteration with mineral oil can be obtained by determining the saponification value against a control sample of pure vegetable oil from the same source.

The following method may be adopted for the determination of saponification value:

REAGENTS

- (a) Hydrochloric Acid....0.5 N.
- (b) Alcoholic potassium hydrovisolution:

Dissolve 40 gm. of the purest KOI in 1 litre of 95% alcohol which has been previously redistilled from KOH over which it has been standing for some time

DETERMINATION

Weigh accurately about 2 gm. of the filtered sample into a 150 C.C. flask pipet: 25 c.c. of the alcoholic KOH solution into the flask allowing the pipette to drain for a definite time. Connect the flask wit an air condenser and heat on the water bath until the fat or oil is completel saponified (about one hour) cool and titrate with the 0.5 HCL, using phenoph thalin indicator. Conduct a blank deter mination along with that on the sample using the same pipette for measuring the KOH solution and draining for th same length of time subtract the number of C.C. of 0.5 N. HCL obtained in th determination on the sample from th number obtained on the blank to obtain the C.C. of 0.5 of 0.5 N. HCL equivalen to the KOH used in the saponification of the sample taken. Calculate and repor as saponification value or number (me of KOH required to saponify 1 gm, o fat or oil.)

The saponification value of commo edible oils and fat used for edible purpose is given below:

S.V.

Biven perow.	D. V.
Mustard Oil	169-175
Groundnut O	188-196
Coconut Oil	246-260
Sesame Oil	189-193
Cotton seed	Oil 193-195
Ghee	220-235

-PHARMACEUTICAL RECIPES

BORIC CINTMENT

Soft Paraffin 70	, ,
White Beeswax	
Boric Acid Powder 10	, ,

Molt the first three together over water bath to sitt in the boric acid. Stir and then remove the source of heat but continue stirring toll cold.

COLD AND INFLUENZA MIXTURES

Antioniated tincture of quinine	1	fl.dr.
Solution of ammonium acetate Compound fincture of	ι	83 19
cardamoms Glycerine Chloroform water to make Mix.	1	fl. oz.

ASOKARIST

Bark of Saraca India (Asokatwak, 16 srs. Poil in 256 seers of water, down to 64 seers train and add to the decoction. Treacle (Guda) Flowers of woodfordia 200 palams, flooribunda (Dhataki) Nigella sativa (Krishnajiraka) 1 palam. Cyperus rotundus (Mustaka) -1 . Dry ginger (Sunth) 1 Beberis Asiatica (Darvo) Roots of Nymphoea Stellata (Utpala Red Flower) Chebulic myrobalans (Haritaki) Emblic myrobalans (Amlaki) Beleric myrobalans (Vibhitaka) 1 Kernel of mango seeds (Amrabija) Cumin seeds (Jiraka) Root bark of justicia adhatoda (Vasalka) Red sandalwood (Rakta

ELIXIR PAPAIN AND DIASTASE

1

Papain	15	grm.
Diastase	15	
Solution amaranth	3	e. e.
Compound spirit of orange	3	**
Alcohol	180	**
Clycerin	300	**
Purified tale	15	grm.
Distilled water to produce	1000	

Mix the compound spirit of orange with the sohol, add the glycerine, tale, and 400 c.c. ater. Use the mixture to make a paste with a papain and diastase, and allow it to macede for 24 hours or more. Filter and add sufficient water to bring the volume well up to 1000 c. Add the solution of amaranth.

Vol. XLII, No. 494.

Chandana)

PIMPLE LOTION

Crystallised alum	1	т.
Sodium chloride	1	**
Sublimed sulphur	1	
Sugar candy	2	lbs.
Spermacet1	1	ib.
Rose water	3	tbs.
Distilled water	3	
Alcohol	10	

Reduce all the solids into fine powder and rub up with the mixed liquids. This lotion is to be applied at intervals during the day upon linen rags, which should frequently be charged. It is an effectual and quick remedy for eruptions on the face.

THROAT PAINT

Glycerin	85	parts.
Tannic acid	15	10
Mix and dissolve.		

ANTACID TABLETS

Calcium carbonate	350	gr.
Heavy magnesium carbonate	250	**
Sodium chlorida	100	
Simple Basis,		
as mentioned below		Q.B.
Mix, and make into 100 tablets.		
To prepare simple basis take		
Sucrose, finely powdered 3 oz.	231	gr.
Acacia, finely powdered	108	13
Distilled water		q.s.

Mix to form into a paste with distilled water suitable for making tablets as mentioned above.

INHALANT

Pine oil		1 dr.
Eucalyptus oil		ł "
Menthol		30 gr.
Alcohol isopropyl		1 JZ.
Directions: 2 or 3 drops on	a	hanakerchief
d the vanour inhalod		

AQUA ANETHI

Anethi oii	100	mins.
Distilled water	6	OZ.
Spirit rectified to make	18	10
Dissolve the oil in 10 oz. of	the spi	rit, add
hot water. Shake well and set asi	de for a	ı day or
two. Decant and filter through	dr. of	kaolin;
then make up with spirit to 18 oz		

TINCTURE CANTHARIDIN (B.P.)

Alcohol (90 p.c.) sufficient		
Cantharidin	0.1	gram.
Chloroform	10.1	mililitres.
to produce	1000	

5

Dissolve the cantharidin in the chloroform, and add sufficient of the alcohol to produce the required volume.

-Recipes for Small Manufacturers

WHITE SHOE DRESSING

Titanium dioxide Stearic acid	20 parts.
Trisodium phosphate Casein	1
Water	5 parts. 75

Dissolve the triandium phosphate and the caseln in the water. Heat, and add the stearig acid, which has been heated to the melting point. Agitate until saponification is complete. Allow to cool, and add the titanium dioxide.

CHOCOLATE PEANUT BARS

Sugar		3	lbs.
Liquid	glucose	3	00
Water		1	pint.

Dissolve the sugar in hot water and mix the liquid glucose. Now cook to 240°F, then add 3 lbs of roasted peanuts, and cook for 10 minutes. Remove from fire, and roll out on tlab. Cut into small pieces, and then dip in thocolate.

TRANSPARENT LABEL VARNISH

Copal	4	02	
Ether	5	Ø.	02,
Acetone	5	8.0	PB
Alcohol 95 c.c.	5		
Mix			

SHAMPOO POWDER

Sodium resqui carbonate, a compound internediate in character between sodium carbonate and sodium bicarbonate, is the aikali par excelence for incorporation in shampoo powders. It may be used in quite large proportions, 40 per cent of sodium resqui arbonate, and 10 per cent of borax form a good sombination.

CRYSTALLISED COCONUT CHIPS

Prepare the coconuts by passing off the rown skin. Cut them in thin slices and pack hem in a crystallising tin. Now make simple yrup enough to cover them. Pour this yrup over them while hot and stand aside for 2 hours. Then drain off the superfluous syrup y removing the stopper from the tin. Spread he chips on trays and put them in the drying oom for 2 or 3 days turning them over at interals. When dry, put them again into the tin; oil a like quantity of syrup as before and let t stand till nearly cold, then pour it over the hips and let them remain undisturbed for nother 12 hours; ther strain again and spread hem on trays, when dry, they are ready for ale. This, of course, will be white. To make he red chips, simply colour the syrup which used for crystallising.

NAIL ENAMEL REMOVER

The remover is a simply formulated article, consisting solely of a mixture of good nitrocellulose solvents.

e solvents. Amyl acetate	20	parts.
Acetone	60	10
Ethyl acetate	20	**
This may be performed if desire	α.	

EXPANDING ALLOY

Lead	9	par!
Antimony	2	••
Rismuth	1	pail

Melt the lead in a crucible and then incorporate the bismuth and antimony. Use just enough heat to melt the lead. This alloy is good for taking impressions from dies, castings, and filling holes in metals.

PRINTING INK FOR CELLULOID AND CELLOPHANE

Some difficulty is experienced in printing on celluloid. In Germany the inks are made by triturating pigments with linseed oil varnish, copal lacquers and cellulose solvents. But best results are obtained by printing on a dull surface and polishing afterwards.

It is not good practice to use ordinary inks, hence special inks are prepared. They armixed with acetone, camphor, amyl acetate, etc depending on the cost of the ink or hardness of the celluloid.

In multi-colour work; it is necessary to allow the first colour printed to dry-out before the second is applied. It is advisable to rub the celluloid sheets with alcohol or benzine before the second colour is printed.

When printing cellophane, inks used are being prepared by grinding with 10 per cent copal varnish and a drier.

The following formulas will produce good inks, when ground with suitable pigment:—

Gum sandarac	30	parts.
Gum Mastic	10	.,
Camphor	1	part.
Ethyl alcohol	500	parts.
Pigment—sufficient to produce	nast	0

Another solution is 1 kilogram gum sanda rac, 1 kilogram camphor and 250 grams venetian turps in 5 kilograms of ethyl alcohol. This is also used as a varnish for printed matter.

The copal lacquers which are required for transparent foil are made thus:—

6 kilograms melted copal, 14 kilograms linseed oil varnish, 8 kilograms of oil of turpentine. 4 kilograms cobalt driers and 1 kilogram boiled linseed oil. The proportion for adding printing ink is 15 per cent.

-IN THE FIELD OF INVENTION

The state of the s

SUGAR WITHOUT MOLASSES

A recent patent taken in America describes a process for the manufacture of white sugar and sugarcane, sugar beets and citrus fruits arount the formation of molasses (Sci. Newsork, 1950, 58, 279). The product is claimed that e superior sweetening and improved metional properties. The process involves the ment of sugar-bearing fluids and juices by the ment of sugar solution after the domization with activated charcoal or bone of the ment of t

YEW BLOOD PLASMA

A new substitute for blood plasma, differing vit one derived from okra recently reported v the Marquetta University at Milwanke is arounced by the General Aniline and Film Superation, Called PVP (for poly-vinyl-pyroliene), the new plasma substitute is a synthetic hemical compound from certain protein subsmes and acetylene gas. It is said to have misual properties when combined with certain ones, as for example, with lodine, which is not we when combined with PVP and can be taken iternally and even be injected into the bloodream. PVP can also be used in combination ith drugs like penicillin. Such use enables the rugs to be retained in the human system longer an when used alone. It is also said to accomhish many of the effects of real pleasure.

-CHEMICAL AGE.

EW RAW MATERIAL FOR SYNTHETIC RUBBER

It is reported that a large volume waste offect of the paper industry is a potential raw derial which may replace or supplement yield in the manufacture of GR-S synthetic liber. The compound is para-alpha-dimethyl viena (PADMS), produced as a by-product in sulphite pulping of the spruce wood, and a potential supply is ample. It has been finated that the U.S. A. and Canada will aduce at least 1.3 million gallon a year, withetic rubber made from PADMS has proved the prior in tensile strength and more like dural rubber in processing characteristic than better made with styrene.

-Indian Rubber Bulletin.

TARCH ALDEHYDE RESIN PINISHING COMPOSITION

A new patent has been taken out by holten's Chemische Fabrickan (B. P. 634, 368).

10 patent claims for the development of a ocess for making dry starch preparations that asolve in cold water but become insoluble

when a solution is dried on a substrate. They are used as textile finishes or adhesives (e.g. in vensering wood). Cold-swelling starch (modified by partial oxidation or hydrolysis) is blended with an aldehyde and a substance other than an aminotriazine that can reach with it to form a resin. Thus the modified starch may be mixed with methyl olurea and acetic acid, or ordinary starch may be mixed with urea, then modified by heating, and subsequently mixed with paraform aldehyde and ammonium chloride.

-JOURNAL OF THE TEXTILE INSTITUTE.

MEASURING SMALL TEMPERATURE CHANGES

A method of measuring small temperature changes in the range 0°-100°C has been developed, which has the advantage of sensivity and and simplicity. The detecting element is a toluene-mercury regulator modified so that the movement of the mercury in the capillary causes a change in the electrical capacitance between it and surrounding packet. The capacitance is connected in parallel with a capacitor in the input circuit of an oscillator working at about 250 Kc/S.

A separate heating oscillator of about the same frequency is used to develop a heat note which is applied to an andio-frequency meter. Both oscillators have a range of adjustment of about 50 Kc./S to enable the sensitivity, etc. of the instrument to be varied, and by building them closely together (though screamed electrically) temperature errors will be negligible since drift due to changes in ambient temperature will affect both oscillators simultaneously. Another practical point is to ignore the lower part of the output meter scale (approximately the first fifth), because when the two oscillators frequencies are almost identical they lock together.

Temperature changes of 0.001° can be recorded as changes of 0.2 m A on a 0-1 m A milliammeter, which has an almost linear temperature variation scale.

-- Indian and Eastern Engineer.

THIOMICID—NEW DRUG FOR TUBERCULOSIS

The synthesis of Thiomicid, p-acetyl aminobenzaldehyde thio-cemicarbazone, and antitubercular drug, is reported. A dilute solution of the drug—1: 50,000—has a bacteriostatic effect more marked than that of streptomycin. No tubercle bacilli were found in the spleen after the administration of 100 mg. of thiomicid. The treatment has been extended to tracheal and bronchial tuberculosis, tubercular infection of the kidneys, bones and joints and the skin, and fistula of the lymphatic glands. Thiomicid can be administered for several months without adverse after-effects (Chem. Age, 1950, 63,652).

-FORMULAS, PROCESSES & ANSWER!

TEMPERING IRON & STEEL

3295 T.M., Patal—Desires to know a process of tempering iron and steel and manufactring erasing rubber.

There are many methods of tempering steel; of these the following are more or less successfully carried out:—

One method of hardening and tempering steel is to heat in a flue of some kind maintained at the required temperature over the fire, and cool in water or a quenching or cooling liquid. and then to provide a tempering bath composed of some substances that will heat, in the open air to a temperature of about 150°F. Another method of tempering, which if capable of reduction to uniformity, would be the quickest and hence most desirable of any, is to heat the steet to a definite temperature, and cool or quench it in a liquid having sufficient greasiness or other quality which acts to retard its retraction of the heat from the steel, and thus give a temper at one operation. As an example of this kind of tempering it may be mentioned that milk and water, mixed in proportions determined by experiment upon the steel for which it was employed, has been found to give an excellent temper. A great deal, however, in this case depends upon the judgment of the operator. because very little variation in heating the stool or in the proportions of milk to water produces a wide variation in the degree of temper. If, on trial, the temper is too soft, the steel may be made hotter, or there may be more water added to the milk. If the steel was heated as hot as practicable without increasing the danger of burning it, more water must be added: while if the steel was made red-hot without being hot enough to cause the formation of clearly perceptible scale, the steel may be heated more

ERASING RUBBER

Some erasing rubbers are made from vulcanised rubber compound. Distinction is made between crasers for pencil marks and crasers for ink marks. In the former case the eraser should not damage the surface of the paper and the compound should have quite different properties from an ink craser which can only function by removing the laver of the paper through which the ink has penetrated. Whilst in the case of the pencil erasers it is to the rubber itself that the erasing action must be attributed. the graphite being removed by its adhesion to the rubber. the other constituents of rubber mixing being mere diluents and cheapening agents, in case of ink erasers it is not so. Hence in making pencil crasers with nure rubber. fillers such as barvies, zinc oxide, etc. which are employed, are merely diluents and cheapening agents. But in case of ink erasers the rubber only plays the part of the binding material for the compounds such as ground-class powder. numice, emery, carborandum, sand etc which by their abrasive and scratching action tear un the namer and so remove it and its ink Pubber compound for making erasers is usually sheeted

on the two-bowl calender to a thickness of from 7 to 25 m.m. These sheets can be vulcanised; French chalk at a low temperature but the region of the control of the sheets are the properation of the sheets are the sheets are the properation of the sheets are the sheets are the properation of the sheets and corners, freed from the sharp edges and corners, freed from the sharp edges and corners, freed from the sharp edges and packed. The surface of the erasers is frequently required to be unsuffered sheet is cured in moulds, the metallic bottof which are engraved with the desired desire

CHEAP WASHING SOAP

2999 D.R.B., Chaibasa-Desires to have formula of making cheap washing soap.

1,		
Coconut oil	18	tos.
Mahua oil	2	**
Caustic soda lye 38°Be	10	54
Water	35	44
Soda Ash	5	
Sodium Chloride	1	tb.

Mix the coconut oil and the mahua of Place the mixture over fire, add lye when m? ed, stir well and let it remain there for about half-an-bour. Lighten the fire now and let boil slowly. When the Ive begins to separ and the mass begins to bubble, add about 10 !! of water and maintain the fire. Keep on sling so that not one undissolved particle a mains. Add the rest of the lye a few minor later and keep on stirring the soap with . crutch. Now add half of the rest of water at add the other half with a solution of Soda Aand Salt later on and let it boil awhile. Le drop a sample quantity and if you find that has attained the requisite consistency it is recootherwise it may be boiled still further. A desired colour may now be added.

Such soaps do not serve much useful pepose. These dissolve readily. If these are solwhite fresh these may prove profitable, othwise these present a nasty appearance on goting dry.

4.4.		
Coconut off	20	tbs.
Caustic soda lye 38°Be	15	
Soda ash	5	**
Soda Silicate	8	17
Water	40	

TT

Mix the entire lye in the oil all at one and let it stand for half an hour. Now place over a fire and commence boiling it with the addition of the entire quantity of water. The boiling mixes up the oil and the lye put the soda ash and the silicate in their natural condition and stir thoroughly while the soap is being formed. This will be a better variety of such kind of cheap soaps.

PHOTOGRAPHIC PRINTING PAPERS

3265 J.M.S., Borsad—Wants to have the recipes of making photographic printing papers.

Cifes of This		-2
10) 4 per cent. cellaidin colladion 62	0 c.	C.
Sulphuric ether 10	0	20
Alcohol (.796) 3	0	88
	5 g	rains.
	5 c.	C.
Alcohol (.796) 12	0	
Calcium chloride crystals	-	rains.
		C.
•	5	
. Citrie acid		rains.
Distilled water	_	C.
Mechol (.796) 3		-
(astor oil solution (1 of oil in	•	**
	5	
Olycerine solution (glycerine	•	**
•	5	

Now add (b), (c), (d) and (c) to (a) in this elect with thorough shaking. Coat on barytated paper and allow to dry. The operation 1st be conducted in darkness. This gives a per especially suitable for separate toning of 18

LUSTRE POLISHING STICKS

3343 T.N., Trichy Desires to know a for cala of preparing lustre polishing sticks.

100 fb, oleo stearine and 20 fb, of doublepressed stearic acid is placed in a kettle and ofted by being brought to a temperature slightabove 130 degrees F.

To this hot mixture, add 5 lb, of triethanola one and allow the resultant mixture to stand, while still hot, a sufficient time for thorough comingling and to enable the chemical reaction of saponification to be completed.

The above mixture is fed into a suitable using machine, which has been previously exted, and there slowly commingled with 220 b of tripoli powder and 180 lb, of powdered hat, this mixing operation generally requiring bout one and one-half hours. The compound a transferred to suitable moulds in which it is blowed to solidify and harden into cakes of mitable size and shape for convenience in appliation to builing wheels.

ABRASIVE WHEELS

Abrasive wheels are made in various ways, has method which we describe below using shele in a dry state and transferring the mixture of a hot mould where it is subjected to presure. The heating is continued until the shellac as melted sufficiently to unite the particles of brasive. The pressure is then released and he articles are baked in an ovan at a slightly igher temperature so as to complete the bondar process.

For small articles the cold mixture of abraive and shellac is sometmes placed in an iron wild and stamped, rolled or compressed with a iron-shod tool. The very fragile articles are ien baked at a temperature just sufficient to take the shellac viscous, the heating being connued as long as is considered necessary.

The proportion of bond required is usually from 5 to 7 per cent. of the weight of the abrasive, but larger proportions are sometimes employed.

The great advantage of shellac over all other bonds is the elasticity which it imparts to the wheels in which it is used.

CAUSTIC POTASH

3353 I.S., Delhi-Desires to know a process of preparing caustic potash.

Caustic potash is largely used in the manufacture of soft soap. It may be prepared by decomposing a dilute solution of potassium carbonate with slaked lime. For this purpose one part by weight of potassium carbonate is dissolved in 12 parts of water, the solution placed in an iron or silver vessel provided with a lid, heated to the boiling point, and then milk of lime gradually added until a portion of the flit ered liquid evolves no carbon dioxide when treated with an acid. The solution is allowed to settle, and the clear liquid drawn off into a wellstoppered vessel. This is then evaporated in a silver basin until the hydroxide begins to volatilise. In order to ensure the complete separation of the carbonic acid from the potash, not less water than that mentioned must be used. and the water which evaporates from time to time must be renewed, for when only four parts of water are present to one part of potassium carbonate no decomposition takes place. A concentrated solution of caustic potash is found to decompose carbonate of calcium. A certain portion of the caustic potash of commerce is prepared in this way. It is usually east in the form of sticks which contain more or less water as well as all the impurities of the orignial potaswium carbonate. It may be purified by dissolving in alcohol, and evaporating the clear solution to dryness in a silver basin.

Pure caustic potash may also be obtained by adding powdered potassium sulphate to a hot concentrated solution of burium hydroxide (baryta water) until a small quantity of sulphate of potassium remains in excess; this is then removed by a careful addition of baryta water; the clear solution is poured off from the barfum sulphate evaporated in a silver basin, any baryta which remains in solution being deposited as carbonate by combination with the carbonic acid of the air.

LIVER OF SULPHUR

3317 A.D.D., Bombay—Wants to have processes of preparing liver of sulphur, etc.

SUGAR SCARCITY

Civilised countries use Saccharine Tablets instead of Sugar; one tablet sweetens a cup of any drink. A box of 5000 Soogrim Brand Saccharine tablets Rs. 15/- and a bottle of 1000 tablets Rs. 4/- V.P.P. free.

D. DARASHAW & CO₁ 24, Jambulwadi, Bombay 2. NEUSTRY SERVE

Liver of sulphur, which is employed medisity, is obtained as a greenish-yellow mass by defing 2 parts of potassium carbonate with 1 art of sulphur, and consists of a mixture of LS, K, S, and K, S, O,

OPPER SULPHATE

Copper sulphate is obtained by directly displving the metal in concentrated sulphuric cid; for this purpose copper and sulphuric cid are heated together. The metal is oxidised y a portion of the oxygen of the acid, while ulphurous acid escapes. The crude copper btained by smelting the ore, and con-sining about 60 per cent, of metal is treated with sulphuric acid. The resulting plution is evaporated in leaden vessels nd the clear liquid in left to crystallise in opper pans. From the mother liquor of the rystals, metallic copper is precipitated by means I iron, because the presence of a large quanty of iron sulphate renders this mother liquor nfit for further making of blue vitriol. This iethod of obtaining copper sulphate is the least xpensive but the salt is not quite pure.

ILICATE PAINT

When the surface to be painted is of a tineral nature, such as the exterior of a house. ae pigments may be mixed with a vehicle conisting chiefly of water glass, or soda or potash llicate. This method of painting requires some are, and a knowledge of the chemical nature of 16 pigments used. Some colours are complete-/ destroyed by the alkali contained in the water lass. Among those pigments which are not ltered by the alkali may be mentioned lime arbonate, baryta winte, manyta allow. Naples yellow, baryta baryta white, zinc white, cadium chromate. brome red, red ultramarine, blue ultramarine, balt blue, cobalt green, chrome green, ivory lack. When a wall in to be painted it should rst be prepared with a mortar composed of pure it lime and clean sharp sand. The water used nould also be free from saline impurities, as sese might subsequently effloresce and desiroy 16 surface of the paint. When the surface of lis plaster is dry, a weak solution of water lass should be applied, and the operation reested several times.

MLA OIL

3416 A.C.P., Banaras—Desires to have a reipe of making amla oil and also Chyavanaprasa.

Take 2½ seers sesamum brayed to a paste, seers emblic myrobalan free from seeds and ruised, and 10 seers sesamum oil. Put the

TRADE MARKS & PATENTS
For any difficulty in registration of trade
marks & patents in India or abroad Consult:
DEWANRAJKUMAR.

DEWAN RAJKUMAR,
Trade Marks & Patents Attorney,
78, Pedar Chambers, Fort, Bombay.
Phone: \$2444. Note: Head office of Trade
Marks Registry for India is in Bombay.

three ingredients together in an iron vessel and place in the sun for one month. Strain out only 5 seers of the soaking oil and put in a fresh lot of 5 seers sesamum oil. Leave aside for one month; strain out again 5 seers of oil and put in a third and fresh lot of 5 seers of oil. Repeat the operation for 6 months. Then strain the whole of the oil and mix together the formulantities. Put in a covered vessel.

Amla oil prepared in this way serves as a good hair dye. Smear the head with it every day half an hour before bath. The hair will be dyed black and no grey hair will be noticeable.

CHYAVANAPRASA

Chyavanaprasa, an Ayurvedic preparation so familiar among the people is composed of the following drugs:—

Barks of Aegle marmelos, Premna serrati folia, Bignonia indica, Gmelina asborea, Bigno hia suaveolens, the roots of Sida cordifolia Hedysarum gangeticum, Doodia or Uraria lago poides, Phaseolus trilohus, Glycine debilis, the piper longum, Tribulus languinosus, Solanum Zanthocarpum, Rhus Suce danea, Phyltanthus niruri, Grapes, Caclogyne evalis, Aplotaxis auriculata, Aquilaria agallocha, Chebulic myro balans. Tinospora cordifolia, Riddhi (not being obtainable, Bala or Sida cordifolia la used). Jivak (Not being oblainable, Tinospora cordifolia is used). Rishabhaka (Bhumi Kushmanda or Bamboo Manna is used), Curcuma zerumbet, the tubers of Cyperus rotundus, Boerhavia diffusa, Meda (Withania sonnifera; not being obtainable Cassia fistula is used). Eleitaria cardamomum. Nymphae stellata, Red sandal wood, convolvulus paniculatus, the roots of Justicia adhatoda, the root called Kakoli, & Leea hirta. Take one pala of each of these. Take also 500 fruits of Phyllan thus Emblica and tie them loosely in a piece of cloth. Boil all these together in 64 seers of water down to 16 seers and strain the decoction. Throw out the seeds of the myrobalans and taking the remnants of the fruits, fry them in 6 palas of ghee and 6 palas of sesamum oil mixed together. The fried product is then to be reduced to a paste on curry stone. After this boil the decoction and this paste, with 50 palas of sugar candy. When the boiled matter assumes some degree of consistency, throw into it bamboo manna 4 palas, the powder of Piper longum 2 palas, that of the bark of Cinnamomum zevlanicum 2 tolas, that of the leaves of Cinnamomum tamala 2 tolas, that of Cardamoms 2 tolas, and that of the flowers of Mesua ferrea 2 tolas, and stir the contents. When cooled, add 6 palas of ghee and keep the compound in a jar long in useful in phthisis, and improves all conditions of debility.

CHEMICAL SHARPENING OF FILES

Files that are not too badly damaged may be sharpened by immersing them in an acid solution. Prior to attempting to resharpen a file, it should be thoroughly cleansed of oil and other particles of dirt, preferably by the use of a INDUSTRY

solvent. The files are then resharpened by immersing them for 20 to 25 minutes at room imperature in a solution composed of the following:—

Sulphuric acid	7	OZ.
Copper sulphate	2	
Borax	2	1.7
Water	1	pint.

When the files are removed, they will be concred with a sludge. This should be removed by a vigorous wire brushing.

ARTIFICIAL VELVET

Of the several methods of production the implest is the use of a concentrated rubber in a dispersion. Practically any cloth is suitable for the fabric base, but of course, certain there is a set better than others. It is not unusual errive the fabric a preliminary light dressing a latex on one side. This promotes a smoth unface in the case of cloths which lack the equired smoothness, and also prevents excessive shrinkage. Where a light weight fabric cannot he base, or a waterproof product is emired, a thorough initial coating is required. It representative formula for a suitable compand is as follows:—

Concentrated latex	100	parts.
Sulphur	3	**
Zinc oxide	5	28
Casein Solution (10 per cent)	5	
Accelerator (of D. C.)	- 1	
Antioxidant	3	part.

Modifications of above may be necessary to anit particular cases. The initial coating is affected by a spreading machine, during which a netration of light weight fabrics is avoided by stretching and not exerting counter pressure. The spreading knife should always be fairly harp, and set in the opposite direction to that in which the cloth is running.

The mix is then diluted with water and seared into the trough through which the fabric s (unning on a rubber roller. The level of the my is adjusted so that it just reaches the inface of the fabric. The artificial velvet base then goes forward to the machine which uplies the velvet dust on the still moist surface. totating sieves, preferably hexagonal in shape nd or 1 millimetre gauge, carry the dusting acdia. They should cover the same areas. As amount of dust they release varies with the quount they contain, both sieves should be in deration. When they are full or nearly empty, ed only one operation when they are half inply, and therefore releasing most dust. About · 6 times as much dust is shaken on the base as s finally required. Meanwhile the fabric is taten quickly and regularly from underneath with flat instruments to insure that each individal hair assumes as perpendicular a position in the cloth as possible. The material is then eft for about 10 minutes on a hot plate, or nessed over drums heated by approximately 5 lbs. of steam to dry it.

Brushing with soft cylindrical brushes takes lace when the artificial velvet is quite cold. The

superfluous dust removed by this process may be recovered and used again. Vulcanisation the final stage, is best carried out in a hanging position and heating for 10-30 minutes at a temperature of 140°C to 150°C.

Different effects may be obtained by varying the dusting media, silk, artificial silk, wool, and cotton dust are also used. The depth of pile may also be varied, and it is possible to emboss these artificial velvets. A similar process is used to produce cloths hardly distinguishable from mosquettes and suede.

SHELLAC

3390 S.H.J., Bombay—Wants to know briefly the preparation of shellac.

Shellac is made by mixing a certain per centage of rosin with seed-lac. The rosin is ground and sifted, and 15 per cent of the weight of the seed-lac used, are added, and the mixed dust in inserted within a long cloth bag. One end of the bag is tied to a post and the other end twisted, while a fire is kept between under the bag. As the twisting over fire proceeds, the dust gets converted into a liquid form and comes out, and is gathered from the surface of the long bag, with brass plates or plantain leaf-sheaths, in the form of shellac. The long bag is only about 6 inches in circumference, but the length may be 15, 30, or 300 ft., according to the quantity of the dust treated. The shellac may be fused in pots into the shape of buttons. This is then known as button lac.

INK FOR STAMPING ON BALLOONS

Nigrosiu	3	grm.
Water	15	#4
Glycerine	70	10
Alcohol		Q.S.
Lamp black		0.6

Dissolve the nigrosine in the water; add a few grm. of alcohol, and then the glycerine. To this mixture add, with constant trituration, enough lampblack to make a thick cream. Dilute this to the desired fluidity with alcohol.

HARIKUME'S

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Grams:

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-READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write the his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful barreer. These replies will be published in the paper only and cannot be communicated by post.]

STARTING A POULTY FARM

1643 L.M.P., Gangpur — Will you please discuss the prospect of poultry farming in our town?

Many portion of India, where the rainfall s not excessive are admirably adapted to the breeding of fowls specially so where the soil is sandy, gravelly or filled with kunkur. I think your place will be suitable for poultry Imported poultry keeping and arming. rearing is progressing yearly. There is no reason whatever why you would not be able to be successful in poultry farming as place is lavourable for starting a poultry tarm but you thould not depend too much upon your servants, who take no interest in the tarmyard and are quite ignorant of what is necessary to its success. The greater number of stocks are killed off, not through climatic influences, but through want of care in the quality of water given to them to drink which should be renewed at least once or twice a day. It is most 100cssary that there should be sufficient room for the number of fowls kept, they cannot be entirely imprisoned and yet kept in a thriving and healthy condition. The fowl house and run must not be overcrowded, so the number of fowls to be kept will depend upon the size of the house and run. A house Bve feet long, five feet wide and six feet high is necessary for very large birds. More than five birds should not be kept in this space The floor of the fowls run must be dug up once or twice every year to a depth of a foot, and great care must be taken to keep the place quite clean or else disease will seen break out in some form or other and destroy the fowls. Charcoal and ashes are beneficial and should be frequently scattered over the ground in the run and house.

A NEWS STAND

22 L.L.B., Dacca--Writes, I have a capital of Rs. 500 which I have borrowed from one of

my friends. Now I wish to start a business at that I can get a decent return. Will you pleasinggest a profitable business?

If you are very earnest for starting anindependent business I would suggest you is
begin your career as newsboy. First select a
very suitable place preferably in the heart of
the town. Then erect a news stand after takin,
necessary licences. This, will cost you verlittle. The great advantage of this business
that it has no dead stock. Unsold papers at
magazines are returnable. The publishers tall
the tisk.

I think the capital you have got will be sufficient for starting the above business are; you can earn decent living out of it. No one else in business makes as many profits on his capital as a newsboy does. You will also get good chance to develop your business. As soon as you secure enough capital you can put in a line of cheap novels and other books of common interest. You may also sell stationery articles required by School and College students.

For further developing your business you may put a signboard "You may order and book here".

As soon as you become acquainted with a customer, you can ask, "Is there any magazine that you would like regularly?". Most customers buy from several news stalls. Consequently you should try to secure all their trade

You should remember if you can, what every regular customer wants, and hand it to him without being asked. That will help you to keep your customers.

Further this business has ample scope to be developed to a publishing house. I personally know some of the premier publishers who began their career as newsboy. But to prosper in this business you should stick to the business and do not leave it if you find any difficulty in the beginning and you are likely to make mistakes at first. But have ample self-confidence and perseverance. You must keep on and work hard,

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-BRIEF QUERIES AND REPLIES

tions of any kind within the scope of Industry are invited. Enquiries or replies from our will be published free of charge in serial order. Questions are replied by post on receipt 18 8 stamps for each question. Subscribers outside India are requested to send two Intergrand Reply coupons for each question. In order to facilitate the work of Editor's Departand to help prompt action the readers are requested to send enquiries in separate letters.

A R.C.J., Kanpur-A formula of cement tistic will appear in due course.

19 S.B.S., Sirsi-Following is a process the lying honey: For 2000 parts of fresh v. take 875 parts of water, 150 parts of dried and pulverised charcoal, 70 of powdered chalk and the whites of beaten in 90 parts of water. Put the ... and the chalk in a vessel capable of turing I more than the mixture and boil , minutes; then introduce the charcoal and on the whole. Add the whites of eggs The continuing to stir and boil again for 3 wife. Take from the fire, and after allowthe liquid to cool for a quarter of an hour, see, and to secure a perfectly clear liquid titer on flannel. Betelnut cutting machines , be had of Oriental Machinery Supplying av Ltd., P12, Mission Row Extension, deutta. You should pack cardamom and 100 in tin cons which may be had of and Tin Box Manufacturing Co. Ltd., 1. a math. Mitter Lane, Calcutta and National but & Metal Works Ltd., 36A, Sahitta urshad Street, Calcutta.

10 R.P.C., Colombo Process of manufacness tubber paint will appear in due course 221 B.R.C., Ambala Cantt. Process of manuturns nitro-cellulose or cellulose nitrates If he found in any book on artificial silk. You o consult the Manufacture of Artificial Silk A beeler.

222 P.C.S.R., Puri Following is a list of webs dealers: Dinshaw & Sorabjee, Sealdah tom, Jubilee Stores, 35, Park St., Calcutta; costa & Co., 195, Govindappa Naick Street, or is and Nathulal Mangal, 178, Anna Pillai to it. Madras. Following is a list of spice 1948. Banshidhar Dutt, 126, Khengrapatty 🖖 Calcutta; Brij Kishore Shah, 14-1, Rup · d Roy Street, Calcutta; Bishnupada Chasarty, 23A, Maharshi Debendra Road, Burran, Calcutta; Giridhari Saha, 231, Maharshi - dat Road, Calcutta; Ananthalal Dhamani (b. 7. China Naiyakaran Street, Madras; 10 N. Co., 203, Govindappa Naick Street, G. hidias; Sirdarmall Seshamall, 47, Govind-· Naick Street, Madras.

23 S.K.G.S., Robertsonpet--For chalk stick 15.2 materials enquire of Calcutta Mineral to Co., Ltd., 31, Jackson Street, Calcutta.

21 M.N.M., Panchmahal -We have no book of Pottery by H. N. Ghose, published by diffic Publishing Co., 1, Church Road, Bha-

225 H.C.I., Jhansi-Stream water which you in manufacturing phenyle is perhaps hard Vol. XLII, No. 494.

water so the disinfectant does not dissolve in it and does not become white.

243 U.E.C., Jubbulpore-Following is a list of timber merchants; Bharat Timber Industries, Sayani Road, Elphinstone Station, Bombay; Bombay Timber Importing & Landing Co., Colaba Chambers, Colaba, Bombay; M. Amratlal & Co., Tank Bunder, Reay Road, Bombay; Dutta & Co., 187, Maharshi Debendra Road, Calcutta; Ganges Timber Trading Co., 67-23, Strand Road, Calcutta; Imperial Timber Corporation, 59-60, Strand Road, Calcutta; T. Sashadri Iyengar & Sons, 8, Sembudos Street, G. T., Madras and T. Sampath, Sydenham Gardens, Sydenham Road, Vepery, Madras,

214 J.C.B., Bandra -- Mantles are knitted from artificial silk fabric, cut into suitable lengths and stitched. These are next dipped in the following impregnating solution: Thorium nitrate 1000 parts; cerium nitrate 10 parts; magnesium nitrate 11 parts; beryllium nitrate 5 parts; distilled water 2000 parts. Mix. The time of immersion of the artificial silk mantles varies from about 2 minutes to about 13 minutes according to the nature of artificial silk.

245 A.V., Kothapeta -For gelatine capsule enquire of Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane, Calcutta.

216 R.L., Sabarmati—Playing cards may be had of S. A. Leonard Biermans, 13-1A, Govt. Place East, Calcutta; United Playing Card Co., Sadar Bazar, Delhi and Indian Playing Card & Carton Manufacturing Co., Lashkar, Gwalior.

217 G.S., Srinagar-Process of deodorising kerosene oil will appear in due course.

248 T.I.P., Kapadwanj -- Wirenail, paper clip making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. Safetypin making machine may be had of Baird Machinery Co., Bridgeport, Connecticut, U.S.A.

249 B.T., Shillong -- Process of making alcohol will appear in due course.

250 T.P.D., Ramnad--We have no book dealing with retreading rubber tyre. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade Fast, Calcutta for the book. 251 A.K.D., Calcutta-Process of drilling

. STANDARD CHEMICAL PHARMACEUTICAL WORKS

Manufacturers of: DRUGS & PHARMACEUTICAL PRODUCTS OF STANDARDIZED STRENGTH & PURITY

1, Jahar Lall Dutt Lane, Calcutta.

giass plate will be found in October 1949 issue of industry.

252 U.M.P., Jaipur City-Slate and slate pencil may be had of Sri Vivekananda Swadeshi Slate Works, Markapur; Sree Jaya Bhalathi Siate Works, markapur and Markapur Slate WOLKS, MERKEDUR, KURDOL Cycle and cycle parts may be use of raine of cie tag, Kurschand Devchand Bldgs., 45-57, Apolio Street, Fort, Hombay; India Cycle Manufacturing Co. Ltd., 9, Tujala Road, Calcutta; Jai Hind Cyc.e Works, Old Gurgaon Road, Pahergani, Delhi and Ranjit Engineering Works, Ludmana, For tubber heels etc. enquire of Bhattacharya Rubber Works, 174, Jessore Road, Dum Dum; Bata Shoe Co. Ltd., Batanagar, 24 Parganas and Bombay Rubber Co. Ltd., 428, Kaibadevi Road, Bombay.

253 T.C.L.I., Salem - For lac enquire of the following firms: Bhagwati Prosad Agarwai, Indian Lac Co., Nirshachati, Dhanbad: and Badiikatra Lac Factory, Badlikatra.

Mirzapore.

· 198

254 T.M.K., Lucknow-Following is formula of vinegar: Molasses 1 gallon; acetic acid 4 lbs. Put the ingredients together into cask of about 40 gallons capacity. Fill it with rain water, shake it up and let it stand from one to three weeks and the result is a good vinegar. It is not possible to manufacture artificial tomato sauce. Process of manufacturing tomato products appeared in January 1951 issue of Industry.

255 T.S.L., Lakhimpur For selling pineapples you may negotiate with Bengal Chemicai & Pharmaceuticai Works Ltd., 164, Manicktala Main Road, Calcutta. You may also

advertise in Calcutta dailies,

@eeteretegenannen ertereteren bonenen beteret

256 S.K.M., Bombay Yes, you may enclose any kind of advertisement matter in a same packet. You may consult Bombay Market, 21, Dadyseth Agiary Lane, Bombay and Calcutta Exchange Gazette & Daily Advertiser, 5, Mission Row, Calcutta.

257 K.S.W., Arantangl - Process of manufacturing sodium silicate will be found in Chemical Industries in India published from this office, price Rs. 3-9 including postage.

258 S.R.V., Bowringpet An article on tamarind seed keinel sizing manufacture appeared in March 1951 issue of Industry. For pulverising machine enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta and Marshall Sons & Co. Ltd., 99, Clive Street,

259 V.N.A, Kapurthala-All the machines you require may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row B. tension, Calcutta; Alfred Herbert (India) Lid 13-3. Strand Road, Calcutta and John Dickinson & Co., 6, Clive Row, Calcutta.
260 L.A.P., Bombay—For wooden io.:

you may enquire of local wood engravers.

262 O.B., Ajmer-Caustic soda may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road and Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane,; both of Calcutta.

263 M,A.M.K., Porbandar—In order 😘 cheapen candy freeze the water and dip it

264 G.S.D., Bombay--You should 118e potassium carbonate in making artificial selv

265 H.L.S., Hathua Refer your query to Basak Brothers, 20, Raja Manindra Raja Calcutta 37.

267 H.N.B., Ahmedabad—Process colouring celluloid sheets will appear in our course.

Mathura - For gramophone 268 T.C., motors enquire of the following firms: Benral Musical Mart, 24, Moti Sil Street; C. C. Sata Ltd., 170, Dharamtala Street; India Gramo phone Mart, 16, Moti Sii St. and K. C. De; & Sons, 161-1, Harrison Road; all of Calcutta

Russelkonda---Address J 270 J.N.P.B., Borroughs Welfcome & Co. Ltd., Cook's Bldg

Hornby Road, Bombay.

272 JH, Colombo -- All the chemicals you require may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Allied Agency, 18, Bonfield Lane; both of Calcutta.

277 B.S.S., Ambaia Cantt-Glass tubes 9 be used as a component part of dropper may be had of Indian Glass Blowing & Mfg, Co. 4. Ramratan Bose Lane: National Glass Blown. Concern, 9, Nayan Chand Dutt Street and Scientific Glass Apparatus Co., 5A, Prosauna Kumar Tagore Street; all of Calcutta,

278 N.S. Shiyali -Process of manufa turing peas cracker and crude crakers walappear in due course.

279 N.T.C., Bangalore—For gummed tape enquire of R. G. Pal & Co., No. 110/2, Grey Street. Calcutta.

283 S.C., Vizianagram City--You was use gum solution as preservative for gut.

284 G.L.K., Porbandar -- Process of make ing slate pencil will appear in due course.

285 S.D., Calcutta-Limestone is build in a kiln and dehydrated lime is obtained.

287 B.S., Kalimpong-For drug lice at and certificate write to Central Drugs Labort

MILK & MILK PRODUCTS

There is a wide field in India for the manufacture of milk products like ghee, butter, casein, evaported milk, etc. Complete information on manufacturing all sorts of milk products including malted milk and milk sugar is given in the treatise,
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IV. Govt. of India, 110, Chittaranjan Avenue. dcutta.

296 L.I.S., Gauhati-We are not aware

any florist magazine in Australia.

208 P.G.M., Cachar-You may consult stomobile and Carriage Builders Journal pubthat by Ed. J Burrow & Co. Ltd., 125, Strand. anden, W. C. 2 and Automobile Engineer, pubi d by Iliffe & Sons Ltd, Dorset House, mford Street, London S. E. 1. You may of ate with the Automobile Association of and 40. Chowringhee, Calcutta.

2 S C.C., Rajmahal -Reply to your en-. letter has been published in Query

ins of "Industry".

203 A R., Etawah-Reply to your letter has

in int by post.

995 S.O.M., Katni-For drums enquire of a Yord Drum & Bucket Factory, 232. Bellasis : Byeulla, Bombay: Bengal Hardware & and Mfg. Co., 90, Netaii Subhas Road, Calto and Imperial Drums Factory, Old Bay Co. 19 Mills, Grand Road Corner, Bombay.

207 S D R., Manipur Road --You may consult d uta Market, 2. Ramlochan Mullick Street, denta and Bombay Market, 21, Dadyseth

Lane, Bombay,

"68 M.V.R.C., Bangalore City-Process of confacturing candles appeared in April, 1950 me of Industry, price is 12 annas including

312 T.C.C.R., Kapadwanj-Wirenatl making whose may be had of Oriental Machinery polying Agency Ltd., P-12, Mission Row Ex-con, Calcutta. For other machine write to and Machinery Co., Bridgeport, Connecticut. SA Details of working the machines will be sailed by the machine suppliers.

113 SRP, Jowai Sewing machine and wing machine parts may be had of Singer Bing Machine Co., E-2, Clive Bldgs., Calentia: C Mullick & Sons Ltd. 77-13. Dharamtala not Calcuita and Dufts Chaudhury & Co.,

² 1 Dharamtola Street, Calcutta.

316 JC., Kanpur-You may practise as a medpath without undergoing any training in · Lomeopathic institute but you have to study science privately at home. You may en-, limade East, Calcutta for self filling fountain We are not aware of any such institu-

You may undertake loan business. Yes, o may appoint subagents if it is laid down the agreement. We cannot advise you on

"by circulation scheme.

317 B.C. Kalyan-Process of mercerising "on will appear in due course.

\$18 D.L., Monghyr-Reply to your letter has been sent by post.

319 M.G., Tinsukia-You may apply the following black paint:—Amber 8 oz.; Linseed oil 4 oz.; Asphaltum 14 oz.; Rosin 14 oz. and Turpentine oil 8 oz. Heat the linseed oil to boiling point, add the amber, asphaltum and rosin. When well melted remove from the fire and gradually add the turpentine oil. As turpentine oil is a highly inflammable substance, it should be incorporated away from the fire.

322 R.U.I., Kanech-Process of manufacturing pencil will be found in Industry Prize Article Vol. I, price Re. 1-15 including postage.

323 L.S.R., Proddatur-Small machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Batlibol & Co., Forbes Street, Fort, Bombay. Glass bottles may be had of Calcutta Glass & Silicate Works, 9, Kundu Lane; Krishna Silicate & Glass Works, 17, Radha Bazar Street and Victoria Glass Works, 130, Mechua Bazar Street; all of Calcutta.

325 F.C.P., Shikohabad-Hindi equivalent of pyrethri is not available.

328 N.B.C., Banaras—Refer your query to India Liaison Mission, Tokyo, Japan, Following in a list of toy manufacturers and dealers:-New India Toys & Novelties, 581, Matungs, Bombay; Satcowrie Dass & Co., 196, Old China Bazar Street, Calcutta and Shree Khunya Muralidhar Toy Works, 390, Sadashiv Peth, Naspur City and Hari Charan Das & Co., 63-H, Radha Bazar Street, Calcutta. You may start mail order business with Rs. 1,000 in the beginning. You may negotiate with Registrar of Joint Stock Companies, P-29, Mission Row Extension, Calcutta.

329 B.P.V.R., Veeraghattam-Address of Turner Hoare & Co., Ltd., is 9, Clive Row, Calcutta.

330 P.L.J., Delhi-Following is a formula of motor grease: Take 10 fbs. quick lime, slake well with water and sieve free from grit. Stir in 30 lbs. rosin oil and allow to stand for 12 hours. Then heat to 210°F, stir well until a good homogeneous mass is produced. Then allow the mass to cool. By heating rosin grease with rather more oil a clear transparent, jelly like mass can be produced.

331 L.M.H., Daheri-Formulas of different varieties of solders will appear in due course.

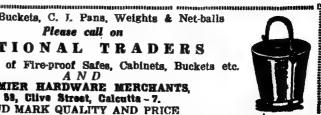
332 K.K., Kotah-You may consult Chemical Industries in India published from this office, price Rs. 3-7 including postage.

For G. I. Buckets, C. J. Pans, Weights & Net-balls Please call on



Manufacturers of Fire-proof Safes, Cabinets, Buckets etc.

A N DPREMIER HARDWARE MERCHANTS. 58, Clive Street, Calcutta - 7. AND MARK QUALITY AND PRICE





100

339 N.D.G., Bhiwani—Formula of plaster coating solution will appear in due course.

340 S.L.D., No address—You may dip the warm clothes in dry cleaning fluid and wash with clear water and dry in the sun.

342 B.Z.J., Kanpur—For textile machines enquire of A. N. Sanyal & Sons, 76. Ramnagar, New Delhi; Apollo Engineering Co., 84, Apollo Street, Fort, Bombay; Bengal Textile & Engineering Co., 40-1, Strand Road, Calcutta and Britannia Engineering Co., Ltd., 28, Dalhousie Square, Calcutta.

343 B.G.A., Hyderabad-Process of manufacturing ginger morabba will appear in due course.

346 T.E.C.R.G.W., Hindupur—Following is the process of preparing chicory powder: In order to prepare chicory, cut into slices the fresh root of wild succery or chichorium Intylens and expose it to heat in iron cylinders along with about 1½ to 2 p.c. of lard. Stir the slices frequently with ladle and remove them when they have been sufficiently fried. Now allow the slices to cool and afterwards grind them into powder in a mill. The addition of 1 part of good fresh roasted chicory to 10 or 12 parts of coffee forms a mixture which yields a beverage of a fuller flavour and of a deeper colour than that furnished by an equal quantity of pure coffee.

347 D.C.S.C., Hindupur--Vide No. 346 above.

351 M.E.W., Meerut -Following is a formula of iron casting crack filler. Iron fillings 98 oz.; Sulphur 1 oz. and ammonium chloride 1 oz. Mix well and use.

353 G.J.M., Ahmedabad—Process of manufacturing all sorts of rubber goods will be found in Manufacture of Rubber Goods published from this office, price Rs. 3/9/- including postage. I think you have already got this book.

354 S.D., Meerut Process of making chalk stick appeared in January 1951 issue of Industry.

355 I.K., New Delhi Essential off is obtained by distilling rinds of orange and lime Wo have no book on Form manufacture Nothing is added to accated water to produce form.

356 LT.S., Bulsar Following is a formula of thinner for cellulose lacquer: Acetone 80 parts; ethyl acetate 20 parts; ethyl lactate 20 parts. Mix and belng volatile keep in well stoppered bottle. Following is a formula of cellulose lacquer: Scrap cellulose 5 parts; ace-

tone 20 parts; butyl acetate 15 parts; chylalcohol 12 parts; ethyl acetate 15 parts; benzol 28 parts; butyl phthalate 1 part, hexalin 1 part. Mix.

358 B.N.T., Asansol—For tobacco legal write to Ashini Kumar Maity, 19, Raja K ma Barabazar, Calcutta: Ambalal Kashibhai Fell 3K, Rupchand Roy Street, Calcutta; Golden Last Tobacco Co., Guntur, Chandajee Kubajee & ma Guntur and Commercial Tobacco Co., Guntur

359 S.S.C., Monghyr—For Bareilly K-write to Indian Wood Products Co. Ltd., nagar, Bareilly.

360 B.D.C., Kanpur—Following is the cess of manufacturing rubber solution: For rubber cut in small pieces is placed in a book of naphtha or benzene in the proportion of part of the former to 5 of the latter. The rule gradually swells absorbing the solvent and tually losses its tenacity. Now the mass vigorous stirring or the bottle on shaking recertain stage and this treatment repeated from the totime, an apparently homogeneous stirring is finally obtained. This rubber solution is very sticky and tenacious.

361 VM. Kanchupuram -In manufacture some you should take caustic soda by 18 so and dilute it further by adding 4 sr, water, No plance the oils on fire and when smoke rises with the by slowly and stirring continuously with the mass becomes homogeneous like honey will sodium chloride and boil for a while.

362 O.S.C., Telaprole Collapsible fulns may be had of Metal Box Co. of India Ltd., 62 Hide Road, Kidderpur, Calcutta.

363 R.V.S., Tindivanam - Formulas of s' to pened, water colour cake, etc. will appear of due course.

364 S.C., Pattukottal—Process of many facturing sherbal will be found in Manufacture of Syrup and Cold Drinks published from the office, price Rs. 3/7/- including postage. First essences may be had of Paradise Perfugic House, 7, Colootola Street, Calcutta. You redeconsult Safety Matches and Their Manufacture price Rs. 5/9/- and Manufacture of Soap, price Rs. 4/9/- including postage.

367 S.L.D., Jhansi- All the chemicals varequire may be had of Calcutta Chemical (c. Ltd., 10, Bonfield Lane and Allied Agency, (C. Bonfield Lane; both of Calcutta.)

368 D.P.G., Pilani—Calcium chloride is used on the large scale, but in the laborate the anhydrous chloride is used for drying gase and depriving organic liquids of admixed water

MANUFACTURE OF RUBBER GOODS

A treatise exposing in a simple style the manipulation of raw rubber in the manufacture of various rubber goods and giving detailed processes of their Manufacture.

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for this purpose it is better that it should be merely dried, as it is then more porous than when fused. Solutions of calcium chloride are used as baths for heating stone-ware stills and ther apparatus liable to be cracked on the sand-line. As a medicine it has been used in scrotum; and glandular diseases.—Dose, 10 to

169 R.J.P.C. Ahmednagar—It is not posto recharge exhaused dry cell. Formulas of sutment, snow, tansen pill will appear in

il course.

7.71 B.W., Banaras For chancas enquire nanshidhar Dutt & Co., 126, Khengrapatty est and Calcutta Chemical Co. Ltd., 10, 116 ld Lane; both of Calcutta.

777 H L.Q., Agra You may correspond on Thacker Spink & Co. (1933) Ltd., 3, a canade East. Calcutta and Chackravertty cateries & Co. Ltd., 4/3A, College Square, conta for publishing your book.

379 F.I.T., Calcutta Process of manufacing magnet will appear in due course.

780 T.K.G.S., Ambur Raw materials equired for manufacturing tooth powder may bad of Calcutta Chemical Co. Ltd., id. Pontield Lane and Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane; both of Calcutta.

t.td., 3t, Jackson Lane; both of Calcutta.

"31 B.J.F., Manipur Rd. - For selling coundan negotiate with the following firms: Citenta Mineral Supply Co. Ltd., 31, Jackson Lane; Dawn & Co., 11, Portuguese Church Street and Quantines (India) Ltd., 19, Strand Road; all of Calcutta.

283 B.N.S.V., News Delhi Following is a let of Indian herb dealers: Drugs of India (Farmers) Ltd., 98-4, Netaji Subhas Road; Banca Lakshmi Bhandar, 13, Cotton Street; Banshidhar Dutt, 126, Khengrapatty Street; Frinan Herbs Stores, 31, Mullick Street and P. C. Dawn & Co., 1, Mechua Bazar Street; all of Calculta.

387 K.V.S., Bangalore City Process of camelling copper wire appeared in January 1950 issue of Industry.

390 R.C.P., Dindot: Process of manufacing phosphorus will appear in due course.

294 B.M.I., Partabgath You may manuticture rubber solution process of which will be 2 and under No. 360 above

392 M.T., Jugsalai - For selling waste eather and rubber advertise in Classified Barm pages of Industry.

396 J.D.S.K., Palam Formulas of hair dye of depilatory cream and hair cream will appear

it due course.

397 K.S.K.P., Kumbakonam Process of vater colour brushes and oil colour brush; will uppear in due course.

399 S.S., Delhi—Distilled water does no require further filtration. You may start four tainpen ink manufacture with distilled water

400 P.N.D., Calcutts-Lime stone when burnt in kiln is known as dehydrated o

quicklime.

403 R.K.J., Rishra—Process of manufacturing aerated water will be found in Manufactur of Syrups and Cold Drinks published from this office, price Rs. 3/9/- including postage. For machine enquire of Essence & Bottle Supply Agency, 14, Radha Bazar Street, Calcutts They will give detail information regarding manufacture of all sorts of aerated water.

408 E.K.R.M.K.M.R., Arantangi—For securing import license you may write to Controlle

of Imports, New Delhi.

415 K.V.S., Bangalore-Process of manufacturing enamelled copper wire will appear in due course.

116 D.S.C., Bangalore-Collapsible tuber may be had of Metal Box Co. of India Ltd., B2 Hide Road, Kidderpur, Calcutta,

122 V.T.E.C., Bombay—For phenacetic powder enquire of Butto Kristo Paul & Co. Ltd. 1 & 3, Bonfield Lanc, Calcutta.

424 M.M.M., Rangoon—You may manufacture lac bangles from lac and sealing wax; but the process is not available. You better consult a mistry efficient in manufacturing lac bangles. To communicate with any querist write him with number and initial care of Industry when your letter will be duly redirected.

128 P.C.W., Allahabad -Process of manufacturing fountainpen ink will be found in April 1950 issue of Industry. An article on was pencil manufacture appeared in February 1951 issue of Industry. A good formula of footh powder will be found in March 1951 issue of Industry. Following is a formula of slate pencil: Powdered slate 60 parts; powdered lime stone 30 parts; sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter fitted with piston. Afterwards cut off into usual lengths and bake over a slow fire.

429 C.t., Kitakarai - Formulas of liquid gum will be found in April 1950 issue of

Industry.

134 S.P.D., Patiala -Your first query is unintelligible. To check liquelying of duplicator in the summer season you may add barium sulphate.

436 M.S.C., Tiruchirapalli-You better advertise in newspaper for securing loans to

finance a textile mill.

440 B.K.I., Kanpur—Carnauba and other waxes may be had of Calcutta Chemical Co. Ltd.,

Technology and Manufacture of Printing Inks.

A Treatise Treating in Full with the Principles and Manufacture of Various Sorts of Typographic Inks, News Ink, Jobbing Ink, Book Inks, Coloured Inks, Lithographic Inks, Intaglio Inks, Etc. Etc.

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10. Bonfield Lane, Calcutta and Banshidhar Dutt. 126, Khengrapatty Street, Barrabazar. Calcutta.

444 F.B.C., Amravati-Wirenail making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Wire may be had of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta. Wire is a controlled article.

445 M.P.C., Rani, Rajasthan-Following is list of kirana merchants: A. H. Bhiwandiwala Co., 45, Anderson Street, Madras; Bhikaji abulal, 130, Varadhamuthiappan Street, labulai, Varadhamuthiappan ladras and Haji Ebrahim Kasam Cochinwala. , Anderson Street, Madras.

447 I.F.T.C., Bareilly-Refer your query to 16 Minister in Charge of Local Self Government

! Uttarpradesh.

- 449 M.A.A., Bhagalpur-We have no book a precious and semi-precious stone manufac-You may write to Thacker Spink & Co. 1933) Ltd., 3, Esplanade East, Calcutta and W. ewman & Co. Ltd., 3 & 4. Old Court House treet, Calcutta. Following is a list of precious tone dealers: M. Lilaram & Co., A4, New Market, alcutta; Thakorlal Hiralal & Co., 9, Dalhousia quare, Calcutta; Hamilton & Co., Ltd., 8, Old ourt House Street, Calcutta and Gem & Co., reat Eastern Hotel Arcade, Old Court House treet, Calcuita and Chimanial Kothari & Co., 91, China Bazar Road, Madras.
- 451 A.D., Motihari--Raw materials for soap mnufacture may be had of Calcutta Mineral upplying Co. Ltd., 31, Jackson Lane, Calcutta. oap machines may be had of Small Machineries ifg. Co., 22, R. G. Kar Road, Calcutta.

452 B.L.S., Sahibabad An article on autotobile rubbing compound manufacture appeared

1 December 1950 issue of Industry.

453 G.L.S., Srinagar—It is not possible to scharge exhausted dry cell battery. Formula of oot polish appeared in March 1951 issue of idustry.

455 K.V.N., Vellore -Following is a recipe f tea flavour:---Rose oil 4 drops; Neroli oil 34 rops; Cagnac oil 200 drops; Lemon oil 11 oz.; anillin 5 oz.; Benzyl acetate 5 oz.; Ethyl fortate 1 lb.; Amyl butyrate 2 lbs.; Ethyl acetate 1bs. Mix and keep in stoppered bottle for use. rocess of blending tea appeared in November 949 issue of Industry. As regards packing you hould use airtight cans; and these cans should e artistic.

458 D.D., Coimbatore-Lemongrass oil is sed as a flavouring agent in soap and other prearations. It is one of the cheapest flavouring gents available in the market. Ceylon quality

3000000 gugungenten erretenereten erreten berten bereiten berten berten berten berten

rass yields good oil.

459 P.C.B., Howrah-An article on fountainpen ink manufacture appeared in April 1950 issue of Industry.

461 S.K.M., Rajkot-Brass and tin sheets may be had of Balmer Lawrie & Co. Ltd 103 Netaji Subhas Road, Calcutta and Nandan & 🦙

43. Netaji Subhas Road, Calcutta.

485 G.G.P., Mugunuwatawana-You consult Pharmaceutical Preparations published from this office, price Rs. 3/9/- including postage

486 A.K.D.S., Ludhiana-Formula lighter appeared in August, 1950 issue

Industry.

487 S.T.A., Colombo-For jewellery box fittings enquire of the following firms: Sin' -& Co., 38, Chandney Chowk Street; Bose, Book & Co., 184, Chandney Chowk Street; Calcutt, Hardware Stores, 137, 138, Chandney Chowi. Street and City Hardware Store, 104, Chandne Chowk Street; all of Calcutta.

489 P.P.R., Tirupur--You may use bisul

phide of soda for refining jaggery.

490 M.B., Kamptee—For shot making machines enquire of Jessop & Co. Ltd., 9° making Netaji Subhas Road and Francis Klein & Co. Ltd., 1. Royal Exchange Place; both of Calcutta For cut pieces enquire of the following firms Bhaghatmal Surajmall, 16. Pagayapatty Street, Harendra Kumar Pyne, 203/1. Barabazar; Herison Road and Indian Textile Co. Ltd., Grest Eastern Hotel Areade ; all of Calcutta.

- 491 N.J.V., Murtazapur-You should add salicylic acid to the gum solution to prevent decomposition and the proportion should be I part acid to 1000 parts of gum. It is not possible to manufacture bindi without gum which is one of the main constituents of bindi. Minerals you require may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, and Dawn & Co., 11 Portuguese Church Street; both of Calcutta.
- Kurduvadi --For 492 G.R.B., coconut enquire of the following firms: A. F Jones & Co. Ltd., Union Place, Colombo. Adamice Lukmanjee & Son, 140, Grandpass Road, Colombo 14; Sherman De Silva & Co. Ltd. 23, Skinners Road South, Colombo and Saboot Chatoor & Co., 72. Hill Street, Colombo.
- 491 S.K., Khamgaon--We have no book on paint and varnish manufacture. enquire of Thacker Spink & Co. (1933) Ltd., 3. Esplanade East, Calcutta and W. Newman & Co. Ltd., 2 & 4, Old Court House Street, Calcutta for the book required.

495 M.D.D., Bombay-You perhaps mean benzyl benzoate which is used in perfumery as a solvent for artificial musk. Formulas of

solvent oil will appear in due course.

WIDE - WORLD

CORRESPONDENCE ENGLISH

By K. M. BANERJEE,

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-REVIEW OF BOOKS

INDUSTRIAL ACCIDENT PREVENTION by W. Heinrich. Published by McGraw Hill Book Ipany Inc., New York. Pages 470, price

Industrial accidents are matter of daily mence in the industrialised countries. In it also with the spread of industries and doyment of mechanical devices, the incidence endustrial accidents is ever on the increase, a spell considerable economic loss to the try in the shape of man-hour lost and heavy cost the country has to pay for page of work. Hence the subject of prevent of industrial accident demands carefully in India where literature on the subject rather conspicuous by its absence. We did therefore draw the attention of our industrials to the book under review which makes identific approach to the problem of pretion of accidents.

This is a scientific age when each day is ing the advent of new mechanical devices I tools and hence it is not too much to cet that with a little care the majority of accidents may be preventible. A large abor of uncontrolled accidents annually did mean a sad reflection on our inventive must and power of organisation. Herein lies usefulness of the volume under review.

The book makes a comprehensive study of causes of the accidents and their remedy a scientific way, and makes most interesting ding. It makes a scientific examination of · basic principles of accident prevention and dains that the occurrence of an injury invariy results from a complicated sequence of tors the last one being the accident itself. is in turn is invariably caused or permitted the unsafe act of a person or a mechanical i physical hazard. The unsafe act is again due inherited and acquired faults of persons. recklessness, nervousness, ignorance of practice, etc., Lastly, account should be cen of the ancestry and social environment for which may be responsible for the developat of the above traits of character. ident is merely one factor in the sequence In this series is interrupted by the climinan of even one of the several factors that comso it the injury cannot possibly occur.

The first step in the prevention of accidents and safety organisation for ensuring safety sures and direction and control of safety aramme. This includes imparting education the workers and provision of adequate first 1, medical and hospital facilities.

The second step is to find out the facts der which the accident has taken place. For 3 purpose each job is split up into its elemantary units listed in their proper order and an examined critically to determine the uses of the accident and if possible to analyse a safety potential of a particular job. The fety analyst examines each step of the job its process from its very beginning with resect to the method, machine or material involved any or all of them can be responsible for the cident.

The third step in the prevention of accidents is to analyse the facts disclosed by the fact finding investigation and draw conclusion from the assembled data.

Subsequent chapters are devoted in a practical way to the selection of remedy on corrective action etc. and the application of the remedy which may be immediate and long term with large, number of illustrations have been given for understanding the principles involved. A course of action is determined by way of the remedy which will make the recurrence of the accident impossible. All these facts have been dwelt upon in separate chapters.

The remedial action in accident prevention has been grouped roughly in four categories:—
(1) engineering revision which includes guarding of machines, their redesigning with a view to minimising accidents; (2) persuasion and appeal to workers for strictly confirming to the instructions in safe practices, etc.; (3) personnel adjustment which means apportionment of labour with works that suit better; and (4) discipline and enforcement of rules under threat of heavy penalties.

Process revision may also be helpful in reducing the number of accidents and thus a separate chapter has been devoted to this. There should be a general realisatisation that processes under which accidents are possible are an indication of their inefficiency and require revision.

Accidents again occur on account of negligence in wearing personal protective devices in handling or working near harmful objects. Similarly occupational diseases may be prevented by recognition of hazards. New products and methods require new methods of control of diseases caused by them and incidental to industrial occupation or processes. This vital subject has also been studied elaborately.

Lastly there are chapters which deal with Safety Psychology, Industrial Fatigue, Illumination and Vision, which are to be taken into serious account when prevention of accidents is to be ensured.

The book is an important addition on the subject of prevention of arcidents and deserves thorough perusal by all interested in the line.

TRANSACTIONS OF THE INDIAN CERA-MIC SOCIETY, Vol. IX. No. 2, October 1959. Published by the Indian Ceramic Society, Department of Ceramics, Banaras Hindu University. Price Rs. 6.

This number deals elaborately with certain Indian and American clays in all their aspects e.g. colloidal behaviour, chemical and thermal analyses, microscopic examinations, refractoriness, whiteware and translucent bodies with auxiliary fluxes. This study is made by Dr. M. L. Misra. There is also a short article on Kyanite Refractories for Glass Furnaces by B. K. and P. N. Agarwalla and another on Heating System in a Porcelain Insulator Factory in Japan by S. Deb (Jr.).

JUK

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

POCKET DIARY & CALENDAR

We have received one pocket diary for 1951 and one calendar from Eastern Type Foundry & Oriental Printing Works Ltd., 18. Brindaban Bysack Street, Calcutta.

POREST BULLETIN

We have received a copy of Indian Forest Bulletin No. 143 being the Interim Report on the Manufacture of Newsprint from Paper Mulberry by Chattar Singh. It describes the experiment carried out at the Forest Research Institute on this work for newsprint production. It is published by the Forest Research Institute, Dehra Dun, U. P. Its price is Re. 1/- only.

AUTOMOBILE NEWS

We have received a copy of the Abuntal number of Automobile News. It is fully illustrated with different models of motor cars and also the picture of the men who are doing business in this line all over India. It also contains several informative articles specially written for the benefit of the car owners and drivers. It is published by Gidwaney's Publishing Co., P. O. Box No. 6095, Colaba, Bombay 5 Price Rs. 2/-.

TECHNICAL BOOKS (IN H)NDI)

We are glad to receive the following technical books in Hindi viz.

- 1. Soda caustic, Soap and Soap without Soda caustic. It deals with the manufacture of caustic soda, and soaps. Its price is Rs. 2/-.
- 2. Mirror Making: It deals with the detailed process of mirror making in six. Language. Its price is Re. 1/2.
- 3. Candle Making: Describing the detailed method of candle making. Its price is Re. 1/8/-.
- 4. Scaling Compounds: It deals with the process of making sealing waxes and other recipes of sealing letters, bottles, etc. Its price is Re. 1/8/-.
- 5. Chemical Magic: Its price is As. '-/10/-. All the above books have been written by Prof. F. C. Trehan and published by Hindusthan Industrial Association, Gurukula Kangri, Saharanpur, U. P.

BLUZ-BLACK FOUNTAIN PEN INK

We have received from Pearl Industrial Work, 23, Telipara Lane, Shambazar, Calenta, 4, one phial of blue-black fountain pen on which is found to be good.

A BOOK ON ELECTRICAL ENGINEERING

We have received a copy of electronic engineering book entitled "Electrical Distration" by B. B. Pradhan explaining the substitution with illustrations and numerous figures. I book is found to be useful to students, apportices and others for all examinations of standard of the final grade examination of the city and Guilds of London Institute. It published by K. N. Gokli, Matunga, Bombay that paice is Rs. 2/8/-.

A DIRECTORY

We are glad to receive a copy of Kaha Commercial, Industrial & Agricultural Directo of Tanganyika. It contains not only classifists of traders, but it gives a vivid picture the territory's natural resources both agrical tural and mineral together with other usef informations. The directory will be found useful to those who intend to have business connectic with that part of the territory. It is edited a published by E. E. Kahan, Post Box No. 9 s Dar-es Salam, British East Africa. Its price to stillings.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below meantioning industry.)

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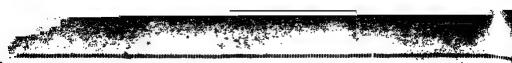
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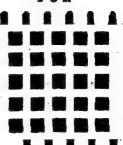


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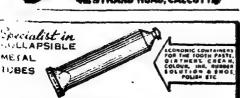
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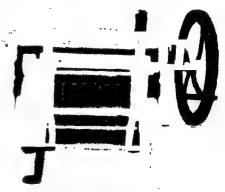
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CALCUTTA, JUNE, 1951

No. 495.

NATIONAL INCOME ESTIMATION

THE importance of estimation of the national income of India has been long realised and attempts had been made at different times by eminent reconomists and satisticians to estimate the aggregate national income of the country.

As the previous estimates are all out-dated a Committee was recently formed with Prof. P. C. Mahalanobis as Chairman to prepare a report on the national income and related estimates. As the correctness will greatly depend upon relevant data and essential statistics, the Committee was asked to suggest measures which could be adopted from now for improving the quality of the available data and statistics.

The chief difficulties which the Committee encountered in framing the estimate included among others: (1) lack of empirical data; (2) absence of a uniform basis for evaluating commodities and services in terms of money; (3) absence of practice of keeping accounts by producers and consumers; and lastly (4) incidence of household enterprises as the major part of the Indian economy.

It goes to the credit of the Committee that notwithstanding these obstacles, it has been successful in submitting a preliminary report containing various illuminating facts and figures associated with the national income for 1948-49 and proposes to issue a further report with greater details towards the end of the year.

In calculating the national income, the Committee has classified the principal earners and their working dependants under the following neads: agriculture, animal husbandry, forestry, fisheries, minerals, industry including small enterprises, trade and transport, the professions and liberal arts, Government services and domestic workers. Estimating the net output of the different sectors of Indian economy and adding to this the net earned income from abroad the Committee comes to the figure of Rs. 8710 crores as the national income of India which when distributed among 34.104 crores of people gives the per capita income of Rs. 225/- which though numerically higher than the previous estimates will in view of the heavy rise in the index of commodity prices mean a sad deterioration of living conditions in India.

-CURRENT TOPICS

PAPER INDUSTRY IN INDIA

The total production of paper by the paper mills in India during 1950 is the highest on record to date and exceeds the figure set for the Industry by the Target Production Committee of 1,10,000 tons by some 400 tons odd. It is understood that extensions to productive capacity and the rehabilitation of existing plant have taken place during the year; and for the next few years, if all goes well, production of Indian made paper will increase by several thousand tons annually, and possibly more if world political situation does not deteriorate.

But how long the mills can maintain to-day's prices is uncertain as apart from the increasing demands of labour, mill's costs of production are mounting in other directions. Prices have gone up for the principal raw materials e.g. bamboo and sabai grass and also for caustic soda, bleaching powder, casein and general mill stores. Prices of the essential imports show a very steep rise, that of sulphur being simply colossal. The events of Korea have delivered another few turns to the wheel of inflation.

In other parts of the globe the demand for pulp and paper has skyrocketed prices to a high altitude but as a result of Government fostering the industry over a period of years by its encouragement the use of bamboo for the production of pulp, the paper merchant in India is in the happy position of purchasing his supplies of paper at more modest rates than elsewhere in the world. It is necessary that more thought is paid to bamboo as the fibre of the future, which may really oust the soft woods from their position of eminence.

Besides bamboo and grass which are mainly employed, rags, hemp and hemp ropes all play their part. Indeed, one

paper mill in India solely uses hemp and ropes. Owing to stock piling efforts, al of these materials are being exported time the country at ever increasing prices whal the Indian papermaker cannot afford to pay without serious repercussions a round. It will be advisable for India to retain these materials for conversion into paper within the country than to have portion returned in the shape of paper a higher price? Moreover much present Forestry matters are the concer of the Government of the States whose policy is to derive the highest possible puc in the shortest possible time by means of annual auctions of forest areas. But th policy should be otherwise and it is necesary to look to the future before or forests are too heavily: damaged. Th remedy seems to be long leases eithe direct with the mills or approved contract tors so as to encourage the proper work ing of areas on a rotational basis of cutting.

FOREIGN INVESTMENTS IN INDIA

According to a recent assessment. India's foreign assets and liabilities he the Reserve Bank of India, foreign bus ness investment in India on private account, as it stood on June 30, 1948, he been estimated at Rs. 397,86 cross This investment which has been calculate on "book value" would amount to Rs. 596.44 croses when converted on market value basis.

Most of the business investment is a long-term basis, constituting nearly Rs. 519 crores or 87 per cent of the total investment. The remaining 13 per centerpresents mostly short-term liabilities commercial banks.

Among the countries the nationals which have invested in India, U. K. lead

with a total of Rs. 376 crores. Next omes U. S. A. (Rs. 30 crores), Pakistan Rs. 21 crores); British West Indies Rs. 15 crores); Switzerland (Rs. 10 ross) and Canada (Rs. 9 crores). The rest comprising about Rs. 135 crores is based by various other countries. Tradinal manufacturing concerns as well plantations, managing agency committees constitute, by far, the major field I foreign investment.

Recent investments. after India is the free, show that during the three vers beginning 1948, a total sum of 10.47 crores was invested by foreigns in various industries in India including tromobiles, bicycles, textile machinery. many and gramophone needles, electrinon-ferrous metals. agricultural achinery, paints, paper and boards, temicals, drugs and pharmaceuticals. ather goods, raw film, woollen, vanaseti sports goods, photographic materials ad food. Among the countries which ave invested during this period are U.K.. S.A., Canada, Ceylon and Switzerland.

A Swiss firm is considering schemes taiting machine tool factory for India have up in Bangalore and a Swedish mis offering technical assistance for the tablishment of a Penicillin Factory. This is a Penicillin Factory. The Standard Cable Company of K. for setting up a Telephone cable by in this country.

ATIONAL INCOME OF INDIA

The National Income Committee was up to prepare a report on national and related estimates of India, to elect measures for improving the tality of available data and for collection of further essential statistics and to commend ways and means of promoting search in the field of national income.

similar work in other countries, the Government of India also made available to the Committee the advice of three distinguished foreign experts on national income viz. Prof. Simon Kuznets of U.S.A., Prof. J. R. N. Stone of U. K., and Dr. J. B. D. Derksen of the United Nations, who came to India in December, 1950.

Already considerable progress has been made by the National Income Unit in its investigation work and a provisional estimate of national income for the Indian Union for the year 1948-49 is available. The computation of national income is, however, a continuing process and has to be carried on from year to year without a break as it has a vital bearing on the formulation of economic policies. It is, therefore, encouraging to learn that it is proposed to continue the National Income Unit in the coming year also.

An analysis of the statistical table shows that the net output per engaged person in agriculture is Rs. 500/-; mining and factory establishment Rs. 1700/-: small enterprises Rs. 600/-. commerce, transport and communications Rs. 1600-600/-: Government professions Rs. services Rs. 1300/-: domestic service Rs. 400/-. It further appears that out of the total estimated national production, no less than 53 per cent. covers the consumer expenditure on food, which shows the underdeveloped character of our economy.

SOAP INDUSTRY IN INDIA

It appears from the presidential speech at the fourth annual Conference of the South India Soap Makers Association held in March that the production capacity of the soap industry varied between 16,000 tons in 1914 and 2,50,000

1.40,000 in 1944 and 2,00,000 tons in 1948 and it fell to 60,000 tons in 1950. The annual consumption of soap in India is estimated at about 1,25,000 tons. There would, therefore, be an exportable surplus after meeting the internal demands, if the productive capacity of the industry can be fully employed. There are 86 major factories and more than 5000 cottage industries which are manufacturing soap in India many of whom have already closed down and the rest are on the verge of closing down.

One chief difficulty met with is the exorbitant rise in the prices of essential raw materials such as vegetable oils, especially coconut oil, groundnut oil, etc. Another handicap has been the high import duty levied on coconut oil 42 per cent. standard and 30 per cent. preferential amounting to 40 per cent of the landed cost. Prices of all raw materials have gone up manyfold. To the misfortune of the industry the purchasing capacity of the masses has gone down at the same time due to various economic reasons. This leaves no room for increase in prices of soap. There was for a time a good demand for Indian made soaps. On the recommendation of the Soap Parel, soap manufacturers launched upon an expensive scheme sinking heavy capital. From 1947, there has been a steady decline in demand. The manufacturers hope Government will come to their rescue, and remove some of the more serious difficulties and ease the situation. If this is not done, the industry will be facing a gloomy future. One of the chief difficulties as previously stated, is the steep rise in the prices of coconut oil. The price in 1941 was approximately Rs. 200/- per ton, in 1950 it has risen to Rs. 2400/- per ton. Import duty on coconut oil in 1940 was approximately Rs. 50/- per ton; in 1950 TO FOO! C 1

port duty of Rs. 300/- in addition w brought the total duty to be pass Rs. 800/- per ton. The soap mapray that the import duty should be copletely abolished or at least scaled do so that Indian soaps may be manufactive conomically and the surplus exported the Middle East.

Caustic soda is another requirer which it is found difficult to procure, of a total requirement of 60,000 tons. ! production is 10,000 tons balance has to be imported. Govern have given licences for import, but supply cannot be located in the U. or Continental countries due to stock It is hoped Government instruct their Embassies or Trade Cor ssioners to locate supplies and ini importers and the Soap Industries so they may get, their requirements. suggested also that new caustic plants should be established to meet it nal demand. The industry is strugg hard. With timely help from Gov ment it is hoped it will regain lost gre at no distant date.

RESEARCHES IN METALS

During the last 10 years the McCommittee of the Council of Scier and Industrial Rresearch has spons a number of important projects and result of its efforts production of n specialised steels and alloys has established. At the suggestion of Committee Tata Iron & Steel Co., I took up production of "surgical steel suitable quality for manufacture of steel instruments during the War and commercial demand for these species is now being regularly Investigations on "electrical steel she were completed and these are now b

the country's requirements to a large extent. Heat resistant alloys of several types have been made and methods of their hot working and heat treatment have been worked out at the Mysore Iron and Steel Works, as a part of investigations on the 'manufacture for electrical resistance alloys.' Several length of wire were drawn with excellent results. All these are examples of how expenditure on to earch bears excellent dividends.

The schemes now being investigated under the guidance of the Committee included; (i) production of aluminium metal by electrolysis of aluminium chloride; (ii) production of nodular cast iron; (iii) effect of high purity manganese as an alloying element in steels and (iv) copper titanium systems. These researches are of considerable interest from the point of view of effectively utilising Indian materials and producing some of the materials by new methods.

Amongst the scheme which have now been transferred to the National Metal. lurgical Laboratory are: (i) extraction of beryllium from Indian beryl for which a www method has now been developed: (ii) 'inufacture of high purity manganese; manufacture of permanent magnets ed (iv) and grain size control in steels various metals. All these schemes aim ' processing Indian ores and raw mate-"... and convert them into valuable prodists for use in the country or export of the processed material abroad. Laborathis investigations on manufacture of d minium titanium alloys have been comthred and potentialities of commercial ' u duction are now being examined. Development of copper silicon bronze is are niting field trials to practically test their suitability for use in machine bearings of various types.

In addition to these investigations a report on the utilisation and development

of high duty cast iron steel in India w compiled for the Railway Board and h been published as a part of the Indi Railway Conference Association Comm ttee Reports. Extensive surveys I classifying and cataloguing of technic data have been carried out with particul reference to (i) fatigue in metals, (wear of metals and (iii) surface hardeni of metals. A survey of research data (i) coinage alloys (ii) titanium, (i zirconium has also been made.

INDIAN STANDARD FOR STRUCTURAL STEEL

The use of steel in structures has be based on rigid standards of perfermance owing to the paramount need for safety of human beings usually associate with such structures. Structural standards about Rs. 20 crores is now between anufactured in India and the India Standards Institution, 19. University R Delhi-8, therefore, brought out an India Standard Specification for Structure Steel, IS: 226-1950. (Price Re. 1-8)

The Specification covers structured steel generally used for bridges, building and heavy engineering constructions. Owing to the present difficulties in obtaining proper raw material, it has been four difficult to limit phosphorus to 0.060 percent which is usual. The maximum phophorus content in the specification has therefore, been raised to 0.065 percent with the proviso that when the strip is required for structures subject to dynamic loading, such as bridges, railway roing stock parts, etc., phosphorus shall nexceed 0.060 per cent.

Requirements of structural steel setions, such as plates, rounds, square flats and rivet bars, have been laid dow specifications in respect of the process manufacture, chemical composition with special reference to sulphur and phosph

mechanical properties have been prescribed. An appendix to the standard gives the forms and dimension of tensile test pieces on which the values of the observed strengths greatly depend.

U. P. MANGOES FOR BRITAIN

The Agriculture Department of Uttar Pradesh is considering despatch of trial consignments of U.P. mangoes to London with a view to exploring commercial possibilities of Indian fruit in Britain. The despatches will be a continuation of experiments conducted last year which provided valuable data on the subject.

With the development of air transport, which has reduced the period of transit, it is now possible to pick the fruit in semi-ripe condition and export it to distant foreign markets without any deterioration in quality. As a result of the experience gained during the 1950 mango season, it is proposed that future consignments will be sent by rail from Lucknow to Delhi, where they will be uplifted by B. O. A. C. aircraft for onward carriage to London.

According to Mr. A. P. Gupta, Fruit Utilisation and Marketing Officer of Uttar Pradesh, who is mainly responsible for the experiments, Dashehri mangoes are better suited for export than the other varieties and the estimate of profit on this brand is as high as Rs. 75 per maund. In order to arrive at definite conclusions, however, Mr. Gupta considers that it is necessary to conduct further trials for two more seasons and see if mangoes can be profitably exported in any appreciable quantities on a commercial scale.

ESTIMATES COMMITTEE'S REPORT

Substantial savings are recommended

the Ministry of Works, Mines and Pow The Committee suggests that obserpublications stocked in the central procation branch, should be weeded out sold to the public at concessional rand steps should be taken to get the mainportant publications reprinted. Government should explore the possibility securing suitable advertisements for popular journals on a commission based of the Ministry of the popular journals on a commission based of the Ministry of the popular journals on a commission based of the Ministry of the Ministr

The proposal for the setting up c new printing press at Nasik, the C mittele recommends may be abando and instead the press should be insta at Aligarh, as this will lead to econo in expenditure on transport and overh charges. Nasik, says the Committee not an ideal place for a printing p doing Central Government work. N of the paper mills which will feed the r press are situated in Northern India : huge expenditure will unnecessarily h to be incurred on the transport of pa alone. Considerable expenditure will . have to be incurred on freight charges sending the printed materials from Na to the offices concerned.

The Committee urges that priventerprise should be encouraged to mup the works of developing and discoving the sources of wealth to supplemente work of the Geological Survey India. In granting mining licenses private agencies, royalties should be finat adequate rates. A mining cess must be levied on the lines of that imposed sugar, tea, coffee, etc., and the proceutilised in establishment of a special branof the Geological Survey for render technical advice to private concerns.

-NON-FERROUS ALLOYS

CATTERED throughout the pages of technical literature are various refertes to non-ferrous metals and their alis, the importance of which is apt to be telepht of because they become inaccessiifter a short time. It is therefore desirthat such information should be ofully sifted and the useful matter leated and presented in a handy form. The is the purpose of this article.

It engineering works nearly all nontons materials in the form of alloys are ad with the exceptions of copper and minim, which are used fairly extenely in the unalloyed state.

Non-ferrous alloys are very numerous.

y are grouped thus:—

- 1. Brasses alloys of copper and zinc.
- 2. Bronzes alloys of copper and tin.
- 3. Special brasses and bronzes.
- 1 Copper-nickel alloys.
- 5. Bearing alloys.
- 6 Aluminium alloys.
- 7 Magnesium alloys.
- § Miscellaneous alloys.

BRASSES

These may be subdivided into

- (1) Alpha brasses, containing
- (2) Alpha-Beta—brasses, containfactured 40 and 44 per cent of zinc. The information contained in this was based on data contained in a faction of the Copper Development sociation.

The alpha brasses are capable of beind-worked to a remarkable extent,
have be rolled, pressed, and drawn,
its can also be worked hot, but not
ority so readily as cold, while the preits of quite small amounts (0.1 per
it) of impurities such as lead will make

them "hot-short". Two 'qualities" of brass are commonly used, basis quality, containing about 63 per cent copper and 37 per cent zinc, and cartridge brass, containing about 70 per cent copper and 30 per cent zinc. A variation of the latter is Admiralty brass, whose composition is 70 per cent copper, 29 per cent. zinc, and 1 per cent tin. In the annealed state cartridge brass has an ultimate strength of about 20 tons per sq. in., an elongation of about 70 per cent on 2 in, and a Brinell hardness of about 60. Cold-working hardens the alpha brasses and reduce their ductility; thus, hard-rolled sheet gives an ultimate strength of about 35 tons per sq. in., an elongation of about 12 per cent, and a Brinell hardness of between 150 and 200. Four "tempers" are commonly recognised as being imparted to brasses by various amounts of cold-working; they are: (1) Soft; (2) Quarter to half-hard; (3) Hard; (4) Extra or spring hard.

The annealing of brasses is a re-crystallisation process, during which new small crystals are formed. This re-crystallisation does not occur at temperatures below 280°C.. and heating to within this limit is done merely as a stress-relieving operation. At temperatures over 400°C., grain growth may occur if the heating is unduly prolonged. Annealing is usually done at temperatures between 300°C and 600°C.. and the material may be quenched in water, or cooled in air, afterwards, the rate of cooling being unimportant.

Articles made of alpha brasses that have been cold-worked often exhibit what is called season-cracking—the formation of cracks some time after manufacture and without the application of any external load. This is due to the internal stresses left in the material by the cold-working,

and is accelerated by corrosive atmospheric conditions. It can be obviated by stress-relieving the articles by heating them to between 250°C and 275°C, for half an hour to one hour. As mentioned above, this treatment has no effect on the mechanical properties of the brasses.

THE ALPHA-BETA BRASSES

When the zinc content exceeds 39 per cent, a second constituent (the Beta form) appears in the microstructure of brass. This constituent makes the brass readily workable while hot. When the zinc content exceeds 49 per cent a third constituent (the game-form) appears: but brasses containing this constituent are rarely used. The alpha-Beta brasses containing this between 39 and 44 per cent of zinc are, however, widely used for hot-pressings, stampings, etc. One of th best known and earliest examples is that known as Muntz metal, whose composition is approximately 60 per cent copper and 40 per cent zinc. It is somewhat difficult to machine, but this can be remedied to a large extent by the addition of up to 3 per cent of lead. The lead, however, makes the metal hot short at about 550°C. and at temperatures above 750°C., so that it can be forged only between 650°C and 750°C. Lead is not soluble in copper or zinc, and remains merely distributed throughout the mass; trouble is consequently sometimes experienced from undue segregation.

BRONZES

These are alloys of copper and tin; although up to 16 per cent of tin may be retained in solution in copper if the alloy is cooled very slowly, the amount that can be retained with practical rates of cooling is about 8 per cent. Bronzes containing up to 8 per cent of tin correspond, therefore, roughly to the alpha brasses; then can be cold-worked, but not so easily as

the brasses. Tin contents greater th per cent are used for castings and : amounts of phosphorus are some added to help in the elimination o oxide and to improve the mechanical perties. Excess of phosphorus lead brittleness and normally the content is about 0.05 per cent; in true phobronze the phosphorus content is from to 0.5 per cent. In the form of case phosphor bronze will give an strength of about 18 tons per sq. in an elongation of about 4 per cent wrought bronzes will give ultimate su ths of 22-24 tons per sq. in. with elo tions of about 60 per cent in the ana. state, while in the worked condition ultimate strength may be as high as 5 tons per sq. in.

GUN METAL

This is an alloy of copper, tin. zince and is widely used for cast particularly when they are of complet form. A common composition is co 88, tin 10, and zinc 2 per cent, and will give an ultimate strength of about tons per sq. in. together with an clo tion of about 20 per cent.

SPECIAL BRASSES AND BRONZES

Additions of manganese, nickel, aluminium, and some other elements prove the properties of brass and he and are widely used. In brasses the sulting materials are generally know, high tensile brasses, but the name the is often misapplied. An example of a tensile brass is delta metal, which is alpha brass containing about 2 per of iron and 1 per cent of manganeses alloy may be cast, may be worked (above 500°C.), is resistant to correlated that mechanical properties that metal substitute for mild steel.

In recent years much progress has made in the development of brasses

an be heat treated so as to be made soft or working and then hardened and improved in mechanical properties. Which alloy has the composition, copper 72 or cent, nickel 6 per cent, aluminium 1½ or cent, and zinc 20½ per cent; it way be not cled by quenching in water from 50 C. and hardened by re-heating to both 500° C. and cooling slowly.

ALUMINIUM BRONZES

i his name has been given to alloys of egget with up to 12 per cent of aluminium ometimes, nickel, manganese, and who l'he copper-aluminium alloys conaning less than about 7 per cent of alu-... i possess great ductility; for example a paloy containing 4 per cent of alumiii. will give an elongation of 80 per etten 2 in.; these alloys may consequentbe readily worked cold. Alloys entaining from 8 to 12 per cent of It mount are used for castings and will are a tensile strength of about 30 tons er eq in, and an elongation of 20-40 per en, on 2 in, in the sand-cast state. When wast the tensile strength is some 30 it cent higher. The alloys are suscepob to a heat treatment consisting of ... thing and tempering.

their corrosion-fatigue properties has very good. They are suitable to they have a very narrow freezing and partly because they absorb ind oxides rather readily when

NICKEL BRONZES

licese are of two types: (a) low in it is and (b) high nickel. The former contain 3-5 per cent of nickel, 5-10 per cent of tin, and 0-2 per cent of zinc, and

in the form of sand-mould castings will give an ultimate strength of 18-24 tons per sq. in. with an elongation of 20-10 per cent. The high nickel bronzes contain 15-60 per cent nickel, 6-12 per cent tin, 1-2 per cent zinc, up to 3 per cent silicon, and 0.1 per cent magnesium. They will give, in the sand-cast state, ultimate strengths up to 30 tons per sq. in.

COPPER LEADS OR LEAD BRONZES

These names have been given to a series of alloys of copper and lead with or without tin. They may be divided into three groups: (a) those containing 5-10 per cent of tin and 8-10 per cent of lead, which are used for castings for heavily sliding members, slide-valves. loaded bearings, etc.; (b) those containing up to 35 per cent of lead and only about 5 per cent of tin: these are sometimes called plastic bronzes, they have little strength and are used chiefly as linings to bearings. shells being used to support them. The third group comprises the alloys in which very little or no tin is used.

COPPER-NICKEL ALLOYS.

Nickel and copper alloy together in all proportions so that the range of copper nickel alloys is extremely wide. The addition of nickel to copper improves the mechnical properties and increases the resistance to corrosion. Up to 2 per cent of nickel is consequently now commonly added to copper for such things as locomotive firebox stay rods; in special circumstances up to 12 per cent has been When the nickel content used. between 15 and 30 per cent the allow has remarkable drawing properties, and is used for the sheaths or envelopes of rifle bullets; these alloys are called cupronickels. A 70-73 cupro-nickel is widely used for condenser tubes as it has been found to have outstanding resistance to corrosion and erosion. These tubes are produced by an extrusion process followed by cold reduction in dies.

MONEL METAL

This is one of the most widely used and remarkable of the nickel-copper alloys. It contains about 70 per cent manganese, and traces of other elements. the balance being copper. It possesses very high corrosion resistance coupled with excellent mechanical properties, the latter, which are better than can be obtained with most other non-ferrous alloys, being well maintained at high temperatures. Monel metal can be cast and can also be worked both hot and cold; mechanical properties are given in the table below. Recent researches have shown that, as with the nickel bronzes, additions of certain elements will make monel metal amenable to heat treatment. The elements used are aluminium, silicon, and beryllium and the hardening is a "precipitation" process, which briefly as follows. The elements combine with nickel to form compounds that are normally insoluble in the monel metal case at ordinary temperatures but which can be retained in solution by rapid cooling. When the compounds are in solution the alloy is soft and readily workable, but when they are precipitated out, by heating to between 400°C and 500°C, and cooling comparatively slowly, the alloy is hardened and its mechanical properties are improved. Cold working also increases the strength and hardness but, of course, reduces the ductility.

The addition of aluminium, silicon, and beryllium to copper-nickel alloys containing up to about 30 per cent of nickel produces alloys that are heat-treatable and which have high corrosion resistance, though not to the same extent as monel metal. For example, an alloy containing 30 per cent nickel, 1½ per cent aluminium, and the balance copper, gives

an ultimate strength of 27 ton; per in. in the annealed (water quenche state, and this value is raised to about 48 tons per sq. in. by reheating; if co work is done on the alloy before reheating the strength may be raised as high is tons per sq. in.

NICKEL BRASS OR NICKEL "SILVER

These names, and also the name German silver, are applied to alloys of copyrazine, and nickel; the copper-zine ratio generally about 70-30 while the sold content ranges from 5 to 30 per cent. The alloys have a silvery appearance to always possess very good resistance to always pheric oxidation and corrosion, have they find a wide use in both engine was and commercial applications. The subbelow gives some typical composition

Copper. . . 65 65 64 62 55 Zinc 25 20 18 33 27 Nickel . . . 10 15 18 5 15

Recently it has been found that with monel metal and the high tense brasses, the addition of aluminium make these alloys heat-treatable.

BEARING ALLOYS

It has been found that the most spable material for use in many bearings one in which grains or blocks of a har constituent are embedded in a matrix of comparatively soft material. This is because the soft matrix permits the bearing to deform sufficiently to conform to the journal or shaft, while the hard block keep the wear low. The soft matrix also absorbs any particles of foreign matrix that may get into the bearing and the prevents scoring of the journal. Most the bearing alloys now in use have this type of structure.

The structure is obtained in phosphor bronze, but the matrix material is too har for these alloys to be satisfactory in heavily loaded, high-speed bearings, such a

and and main bearings of high speed nal combustion engines. For lighter however, phosphor-bronze is much the tin content may range from 5 to er cent but usually is between 10 and cent, phosphorus is between 0.05 () per cent, and up to 20 per cent of nay be included. Phosphor-bronze es are sometimes made moulding a of copper and tin, in powder in presses under heavy pressures in 40,000 lb. per sq. in.), heating up light 700°C., and cooling in air or thing in oil. These bushes, being tly porous, can retain oil in the pores, making them self-lubricating over periods. Graphite may also be ded in the mixture of powders.

for heavy duty bearings white-metal or copper-lead alloys are now rilly used. The oldest white metal shbitt's metal, which contains about er cent of tin, 5 per cent of copper. 10 per cent of antimony. The anti-.. in the form of a solid solution in of the tin, provides the hard blocks ains; these blocks, being lighter than matrix metal, tend to float to urface, but this is largely prevented to formation of a compound of copper tin which, being present in the form mass of needle-like crystals, entangle antimony-tin blocks and thus preundue segregation. Because tin is repensive attempts have been made velop white metals containing smaller mages than are used in Babbitt l. and metals containing 75-84 per of lead, 5-15 per cent of antimony. only 5-12 per cent of tin are now in The percentage of antimony is gely between 10 and 12 and this eleagain provides the hard blocks in structure. Broadly speaking er the lead content the less severe luty the bearings can withstand.

In recent years "alloys" of lead and copper (misnamed lead 'bronzes") have been developed and have largely displaced white metals in high duty bearings. These alloys contain from 25 to 45 per cent of lead, from 60 to 75 per cent of copper, and small amounts of other elements; for example, up to 1 per cent of tin or 1-1½ per cent of nickel and up to 0.5 per cent iron.

Lead and copper do not dissolve in each other at all and lead bronzes are merely mixtures of the two metals. Segregation is, therefore, a difficulty that is commonly met in the production of copper-leads, but with suitable casting or melting techniques it can be avoided.

ALUMINIUM ALLOYS

Pure aluminium is too soft, and its tensile strength is too low, for it to find much use in engineering applications but it is extensively used in a 99.9 per cent pure state for such things as motor-coach body panels, trimming, and fittings, and for architectural and domestic purposes. Additions of certain elements, however, improve the mechanical properties so much that, weight for weight, aluminium alloys are equal in strength to the best alloy steels and are consequently very widely used. The principal alloys may be grouped as follows.

- 1. Aluminium-copper alloys.
- 2. Aluminium-zinc-copper alloys.
- 3. Aluminium-silicon alloys, sometimes with copper in addition.
- 4. Alloys 1, 2, or 3 with additions of magnesium, manganese, nickel, iron, or tin.
- Complex alloys, duralumin, Yalloy, the R. R. alloys, etc.

THE ALUMINIUM-COPPER ALLOYS

The addition of copper hardens and strengthens aluminium, the tensile strength increasing steadily with the cop-

her content ah to whout o het cent of copper, beyond which point little improvement occurs. Up to 12 per cent is, however, used because the machining properties of the alloy are improved by the higher copper content. Two alloys in this group are widely used for castings; one contains about 12 per cent of copper and the other from 6 to 8 per cent. The properties of the latter can be improved by a heat treatment consisting of heating to about 540°C. and quenching in water but the improvement does not occur until some days after the treatment. This delayed action is known as ageing and is characteristic of many aluminium alloys.

ALUMINIUM-ZINC-COPPER ALLOYS

The addition of zinc also hardens aluminium, but when the percentage exceeds about 13 the alloy suffers from hot shortness and is thus unsuitable for casting. This hot shortness can be eliminated by the introduction of $2\frac{1}{2}$ —3 per cent of copper and an alloy containing 13-14 per cent zinc and $2\frac{1}{2}$ -3 per cent copper is widely used. It has an ultimate strength of between 11 and 16 tons per sq. in.

ALUMINIUM- SILICON ALLOYS

In these alloys the silicon content ranges from 5-15 per cent and the alloys possess work-hardening properties. Thus aluminium-silicon sheets are supplied in three "tempers". hard, medium, and soft, according to the amount of work done on them during the rolling process.

When the silicon content is between 8 and 15 per cent the properties of castlngs may be improved by putting a small quantity of an alkaline metal, an alkalineearth metal, or one of their compounds, into the molten metal immediately before pouring. Sodium is commonly used and the result is a great refinement in the structure of the material, the addition apparently checking the growth of the first

in size. The process is known as tradification. Thus a 13 per cent silicon alloy cast in the ordinary way might show at ultimate strength of only 6-8 tons per cent. If modification is done then this alloy might show an ultimate strength of 12-16 tons per sq. in. and an elong time of 7-15 per cent. The modified alloy are very malleable in the as-cast condessity during solidification and this helps in the production of sound castings.

DURALUMIN

This is one of the oldest and had known aluminium alloys and is work used in the form of forgings, pressings and rolled sections but is not suitable for castings. Its composition is copper 35 4.5, manganese 0.4-0.7, silicon about 0 per cent and, sometimes, magnesium 34 0.7 per cent. Iron is usually present but must be kept below 0.5 per cent. Duri lumin can be worked readily at temporatures of about 500°C, and after quenching ages over a period of 4-5 days.

Y-ALLOYS

This has the composition copper 4 magnesium 1.5, and nickel 2 per cent 1 may be forged but is most widely use for castings. To develop its best pro or ties it must be quenched in boiling ware from a temperature of about 515°C. ... then be aged at room temperature in about 5 days or in boiling water for about 2 hours. Its ultimate strength is about it tons per sq. in. in the cast and heat-tre.... form but chill castings, after heat to it ment, may show a strength of 20 tons of sq. in. The alloy maintains its stren : well at high temperatures and is widely used for the pistons of internal combus tion engines.

The only magnesium alloys of any witance are those known by the trade Elektron. Of these there are secompositions, each used for certain and each possessing al properties. One alloy, used for and has the composition aluminium zinc less than 3.5. manganese less , 0.5, impurities less than 1.5 per cent, Latince being magnesium. This allow in ultimate strength of about 8 tons in. For rolling into bars an allow which has the composition alumi-11 per cent, zinc less than 1.5 per manganese less than 1.0 per cent. arities less than 1.5 per cent. This y will show an ultimate strength ving from as high as 17 tons per sq. in. to smaller sections down to about 14 per sq. in. in the larger sections. For uding into bars an alloy containing more than 0.2 per cent aluminium and more than 2.5, 0.2, 0.2, 0.4, and 0.5 cent respectively, of manganese, zinc, the silicon, and impurities is used. vill give a proof stress of 8 tons per is and an ultimate strength of about tens per sq. in. with an elongation of 2 per cent. For general forgings composition aluminium 7.5-8.5, zinc 355, manganese 0.15-0.25 is used and sive a proof stress of 11-14 tons per and an ultimate strength of 18-22 per sq. in. a reduction of area of 10 per cent and a Brinell hardness Wen 65 and 75.

limited extent but at a temperature in 270° and 330°C, it may be worked dily. It is the lightest alloy known ent and is used extensively in aero-construction. It is poor in resistance irrosion and must be protected by some ace treatment such as by painting.

those having zinc, aluminium, lead, or tin as the base metal; the first two are much more widely used than the last two. Lesser used base metals are copper and magnesium.

Two commonly used zinc base compositions are: (a) copper 2.5-3.5, aluminium 3.5-4.5, magnesium 0.02-0.10 per cent; and (b) copper 0.1 max., aluminium 3.5-4.5, magnesium 0.03-0.08 per cent, zinc forming the balance in each alloy.

SOLDERS

These are divisible into two groups: (a) soft solders, and (b) hard solders. The principal soft solders are lead-tin alloys; thus tinsmith's solder ranges from about 40 per cent to about 70 per cent tin. A composition-tin 63 per cent, lead 37 per cent-gives the eutectic alloy, which melts at 183°C. British Standard Grade B solder has the composition, tin 50 per cent, antimony 2.5-3 per cent, lead 47.5-47 per cent. This is the type of solder used for most manufacturing work. Plumber's solder has the composition, lead 70 per cent, tin 30 per cent; it freezes over a wide range of temperature and, being pasty between the beginning and end of solidification, is suitable for making "wiped" joints. Tinsmith's solder always used with a flux, whose function is to render fluid the oxides produced and to form a film over the surfaces being joined so that the oxides can be kept away. The chief fluxes are "killed spirits" or zinc chloride, ammonium chloride, resin, and tallow. Cored solder, in which the flux forms the core or cores, is obtainable and is being more and more used.

When hard solders are used the process is sometimes called brazing and the solder is then called spelter; a common composition for spelter is copper 50 per cent, zinc 50 per cent, but up to 1.0 per

cent of silver is sometimes included. Another hard solder is that known as silver solder; this consists of 10 per cent nickel, 40-50 per cent zinc, the balance copper. The flux commonly used for brazing and silver soldering is powdered borax.

LOW MELTING POINT ALLOYS

Alloys which melt at low temperatures, ranging from 60° up to 200°C., are of great use for certain purposes and numerous alloys have been developed. One of the oldest and most used is Wood's metal which melts at 60.5°C. It consists

of bismuth 50, lead 25, tin 12½, cadming 12½ per cent. Another is Rose's meta which is the same as wood's, except that the cadmium is replaced by tin; it nells at 93.7°C. Cerromatrix, an alloy developed by the Cerro de Pasco Coppes Corporation, has the composition, bismuth 48 per cent, lead 28.5 per cent, tin 14½ per cent, and antimony 9.0 per cent. I melts over the range of temperatum 102.5°-227°7C, and expands on soldification. Among other uses it is used for setting press-tool punches into her holders.

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-PLASTIC AS PROTECTIVE COATINGS.

hAMP atmospheric conditions affect the efficiency of all electrical and apparatus very seriously, and adente steps have to be taken to prevent stare condensing on, or being absorbed, the insulating material employed. It is particularly important with refactors wound coils such as are used transformers and chokes.

the wire used for low frequency coils Linokes is usually enamelled, and for halfequency components the wire is and with silk, cotton, or both. Enamel . ble to use it alone because it can efected by chemical fumes and solvents. Let's also liable to be cracked or crazed the stresses set up in the coil winding THIONS, Silk and cotton, although insulators when perfectly dry, are the absorbent. Also, moisture conring between the layers of wire, and accent turns of the winding, can be quite ly trapped and eventually absorbed by insulating medium. Often this is the se of corrosion on the iron stampings Hor the core.

To obviate the dangers which arise a moisture is allowed to condensate localical fumes are allowed to penetratio such windings, it has become a many to completely impregnate the od coil with a suitable insulating and the resistant varnish or compound.

to meet modern requirements such counds, apart from being good insusapable of withstanding the potentiferences existing between separate of the winding, must also be stable a wide temperature range. They ald not soften at temperatures up to C., and should not become brittle or ak up at temperatures as low as 40°C.

Nevertheless, in order that impregnating can be carried out efficiently, and to ensure that the compound reaches all the small spaces right inside the coil, it must flow freely at a temperature below that which is likely to damage the wire covering. It is desirable that it has a very marked flow point, so that a minimum temperature change will transform it from the solid state into a free running liquid. When it re-sets the compound should be impervious to moisture penetration, and unaffected by temperature changes within the range stated.

When low frequency coils are being dealt with, the only electrical requirements are high dielectric strength and good insulation resistance, but in high frequency circuits compounds with a low-loss factor must be used, as otherwise the impregnating medium will constitute a leakage path for high frequency currents.

TYPES OF COMPOUNDS AVAILABLE

Research to produce the ideal compound has gone on for many years, and at present numerous types are available. These may be broadly classified under three headings:—

Waxes, air-drying varnishes containing natural drying oils and resins, and varnishes with a synthetic-resin base, in a solvent, which is dried off by evaporation and heat polymerization.

All three types are widely used, but the following points should be noted.

Waxes at present available are not very satisfactory over a wide temperature range, and do not offer the same degree of mechanical protection as the varnishes.

Air drying varnishes contain solvents which dry off upon exposure to air. If it were possible to ensure that these solvents

are completely dried off, such varnishes would offer excellent protection, but great care must be taken to ensure that quantities of the solvent are not trapped inside the coil. It is quite easy for this to happen because after the coils have been dipped the varnish on the outside will dry first and the drying process will continue inwards. There is, therefore, no way of escape for the solvent from the varnish which has penetrated right inside the coal. recognised that it may be impossible to guarantee that no solvent has been trapped in this manner, and the modern tendency is for varnishes to be mixed with solvents which have no deleterious effect on the enamel or cotton covering of the wire.

The synthetic-resin varnishes, which are used far more extensively than any other type, also suffer from the disadvantage of possessing solvents which must be dried off completely, but they are not dependent on air oxidization as a hardening and drying process. A coil dipped in a synthetic-resin of the thermo-setting type is subjected to a heating cycle similar to that applied to a compound for moulding purposes, and the chemical action which takes place is also similar. It has been proved to be much easier to ensure that a synthetic-resin varnished coil is dried off, right through to the core, than one dipped in an air-drying varnish of the ordinary type. In all cases, however, the depth of winding is the governing factor.

The adoption of high frequency heating has also helped in this respect. When his method of heating is applied, heat is generated uniformly throughout the coil, consequently the inner layers of varnish iry off and the solvent is released before he outer layers have hardened.

To the same extent, as it is essential o avoid trapping solvents from the imregnating compounds, so it is equally as important to be sure that no moisture trapped inside the coil after the impregnating process is completed. It has therefore, become standard practice to preche the coils and carry out the dipping process in a vacuum. A typical cycle of operations for impregnating a coil in synthetic-resin varnish is described below

IMPREGNATING PROCESS

The coils are first dried thorough at a min wan of 110°C. for anything from two twenty hours, according to size. The are then transferred to the impregnation plant, and a vacuum is maintained to that tank for not less than 45 minutes. Col varnish is admitted until the coil are covered.

The next step is to re-admit an ame compress it to between 60 and 80 lbs per sq. inch, under which conditions the coal are left for a period, the duration depending on the size of the coil. This may vary between thirty minutes and one hour. The varnish is then drawn off and the coils are left drain. They are then transferred to a hot vacuum tank wherein a temperature of between 70°C and 80°C is maintained for a few hours, and a unculating atmosphere is maintained through a solvent condenser. This is to divid the solvents. After this, the temperature is raised to "cure" the resin.

Tests for insulation resistance are then made. The figure usually required is 180 megohms between coils, but a minimum figure: of 25 megohms is permissible in many applications. If the core is fatted before impregnating, the same insulation resistance is required between the souls and the core.

DIP COATING

It has been proved that one application of the impregnant is not enough to enable the insulation resistance figure to be main

ned up to the standard in first grade rk, such as is suitable for tropical use, therefore, a second application is led for. This is carried out in much the no manner.

This second coat does not provide as ad protection as a dip coat of a more dompound. Most manufacturers adopted the dip coat as standard circo.

A good dip coating material should stable over a range of temperature or plus 70°C. to 40°C, and must also resistant to moisture and man-handling, addition its heat dissemination propersonant be such that it does not shut in sheat which may be generated in the ausformer or choke. This is important, cause the dip coat is usually thick and vers the coil completely.

There are various dip-coating comands available, most of them of the anninous type, and the process is a simcome of dipping the pre-heated coil in molten compound or solution, care any taken to prevent any air being apped during the dipping process.

It is most important that a dip coat called adhere to the surfaces which it has veloped, and that no expansion or rinkage which would cause it to break wiv from these surfaces should take with changes of temperature or the period of ageing. If such breakwas do occur, a moisture trap between a cuter surface of the coil and the inner that of the compound is created. It is as important to ensure that no theles exist in the coating, and that al cult wires from the coil bobbin are chared securely so that vibration does it cause these wires to oscilate in the timen, thereby setting up a cracked there on the latter material. Yet anher important point to note is that the seving used to insulate the lead-out Vor. XLII. No. 405

wires should be a very good fit on the wire, and should be sealed to prevent moisture entering between the wire and the inner wall of the sleeving. On no account should a varnished fabric sleeving be used for covering these wires. Fabric sleeving absorbs moisture and acts as a wick, drawing the moisture into the transformer or choke winding.

A transformer or choke treated as above should pass a "tropical test" of the following order.

Exposure to a temperature of 71°C. for 6 hours, followed by a cooling period of 16 hours. Then exposure to a temperature of not less than 60°C. with relative humidity at not less than 95% for 6 hours. The transformer or choke should not be heated prior to this part of the test. In other words, it should be taken straight off the bench and placed in the test chamber which has previously been adjusted to run at these conditions.

For the next part of the test cycle the component should be left in the chamber, and the heat and humidity controls of the latter should be switched off. No air circulation should be permitted. This condition is to be maintained for 16 hours. It is to be expected that heavy condensation will occur during this period, which is intended to simulate the right conditions in a tropical climate. After this 16-hour period the component should be removed from the chamber, the surplus moisture should be wiped off, and a skeleton electrical test should be carried out immediately. Then repeat the above procedure from the stage where the component is exposed to 60°C. and 95% humidity.

The above cycle of tests is designed to accelerate the actual conditions likely to be encountered in service, but other factors play a part in attacking the reliability of the component when exposure to actual conditions takes place over a long period. Consequently more stringent test conditions are being laid down which involve exposure to a temperature and humidity cycle of 25°-40°C. at 95% relative humidity for two months or more. This continual exposure to water vapour and condensation very soon breaks down all but the very best of components.

Another recent development is the totally enclosed hermetically sealed type of transformer, for which a metal can, fitted with ceramic bushes as terminal connections, is used. In this type of construction a plastic compound is used as a filling. This compound is injected into the can under pressure, after the transformer or choke assembly has been thoroughly dried and impregnated with varnish.

Components treated in this way will probably give years of reliable service, but naturally the expense is greater than that incurred with other methods of protection, and it has yet to be definitely proved that any criticism of the varnished impregnated and dipped type, which may arise from time, is not really a criticism of the processing carried out on the particular range of components under test, rather than criticism of the basic method and the materials used.

COILS FOR HIGH-FREQUENCY CIRCUITS

Special waxes have been developed for treating coils designed to carry high frequency currents. In addition to possessing all the normally desirable properties, they must also possess a very low loss factor, and a dielectric constant of not more than 4.5 at frequencies up to 20 megacycles.

Surface resistivity should be at least 10° meghoms per cm². Volume resistavity 10° meghoms per cm².

The wax should not melt at tempe tures below 75°C., and no cracking sho occur when the wax is exposed to 40 (

The wax should be resistant to me ture penetration, and should have injurious effect on the enamel or fall covering of the wire.

A number of such waxes exist and widely used as protective coatings.

The composition of these virusaries considerably. Mixtures of parffin wax, which is obtained from petroly by distilling processes, chlorinated rubband chlorinated naphthalenes, are not used. Chlorinated naphthalene combined with many other synthetic anatural waxes, and is used with rubband for improved fire-resistant products, a with other mineral waxes to raise softening temperature.

An important point to note in corntion with the uses of waxes in equipmwhich may be exposed to tropical contions is that mineral waxes are superior to any of the natural way because of their fungicidal properties

Waxes embodying a chloring naphthalene content are far less likely support the growth of fungus than nature vegetable waxes. Chlorinated naphritienes have remarkable anti-fungus properties and good electrical properties

The method of treatment used so that been simple dipping process, but we the development of injection mould technique, and the introduction of materials. Which are combinations waxes and new synthetic resins, be melamine, it is highly probable that future all protective coatings will be a plied by moulding around the article to protected a hard, moisture and heat a sistant plastic. The more recently developed waxes are hard, and can be applied by adopting an injection moulding technique.

The use of varnishes with low loss operties, such as polystyrene varnishes, also on the increase, although one of the fliculties encountered with such products that they are difficult to apply satisfactly on a production basis, and contain heats which are injurious to many of wire-coating mediums which are tensively employed.

ONDENSERS AND OTHER COMPONENTS

Where it is intended that they be ad in circumstances involving exposure extremes of temperature and humidity, advisors and other radio components also dipped or moulded in waxes and aling compounds. This sealing is very certain having regard to the small cacities involved, and the effect on such weitles of moisture penetration.

For small condensers, for use in high quency circuits, the practice of mouldthe condenser plates and dielectric in whose is being extensively adopted.
The can be done on small injection while machines, the only objection better softening and deformation temature of this plastic. Flat section,

block type condensers have been moulded in Bakelite housings for some time, and the tendency is to totally enclose all condensers in a moulded casting. Moisture penetration through the holes provided for the connecting wires or tags often occurs if the seal between the moulding material and the wire is not perfect. To overcome this, special waxes or varnishes are applied to provide an additional protective film.

GENERAL PROTECTIVE COATINGS AND VARNISHES

Synthetic resins are, of course, used in the compounding of protective enamels for metal work used in radio and electrical equipment, and for finishing wooden radio cabinets, etc. They are also used as temporary protective coatings for transit purposes only. Ethyl cellulose is already being used in this way, as a thin film, which is applied by dipping or spraying. When this film sets hard it acts a protection against moisture and fungus. The coating can be stripped off when transportation is complete and the component is required for use.

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-MANUFACTURE OF NOEVLTY LEATHERS

THE range for novelties in fancy leather goods has caused the up-to-date light eather manufacturer to be continuously in the alert to produce novelties in eather manufacturer to be continuously on the alert to produce novelties in leather. These, when made into the many fancy articles made from leather, such as purses, handbags, photograph frames, jewel cases, etc., are intended to catch the public eye.

The following methods will indicate to some extent a few of the processes which nay be regarded as typical of the angenuity which has been exercised in the production of these novelty leathers.

ANTIQUE LEATHERS

This is a leather which is much in fashion for upholstery and fancy purposes. Antique or Spanish leather is mited on split hides, calf, kips, and also sheepskins.

A common method of producing an antique effect is to take advantage of the ase of a waterproofing agent applied to the more prominent portion of the embossed grain of the leather; these agents are commonly called resists. One verv common method consists in dyeing, staining, or spraying the leather a brown or other suitable colour, and afterwards embossing with a natural wrinkled cowhide print. To the upper portion of the grain printed leather is carefully the əf resist: grease applied wax or the application being made by hand. The leather is then sprayed or brushed with a soft-haired brush, with a suitable black dyestuff or a solution of iron. The effect Is to dve the crevices or the lower portions of the printed grain a brownish black, and have the higher portions where the resist has been applied: the leather produced

thus resembles a piece of cold leather with a worn appearance on the more prominent part of the grain surface. The wax resign is subsequently removed by wiping the dry leather over with a suitable oil solvent e.g. petrol, trichlorethylene, etc.

A simple method of applying the faity resist is to make a mixture of equal parts of paraffin wax and hard beef-tailou melting them together and allowing the mixture to set in a suitable shaped vessel so as to produce a solid block of grease, somewhat similar in size and shape to a pound bar of soap. Application is made to the leather by simply rubbing the solid bar of grease over the grain surface.

The fatty resist may be substituted by either a solution of shellac dissolved in spirit, or a cellulose solution such as a used in finishing. When the solvent coporates, both these solutions leave behind a transparent film, and it is not necessary, therefore, to remove the resist from the leather after spraying with the black dyestuff solution, and no further treatment of the leather is essential.

A variety of effects are produced upon skins by heavily embossing the goods after dyeing them to some particular shade, and drying them out as if for finishing in the ordinary manner, and then, after softening the skins by book ing them on the table, lightly snuffing of the grain surface of the skins, either be the buffing machine or by hand with 1 carborundum or emery covered block of as to remove the high portions of the embossing. The skins may be left wither as buffed and finished in the usual walk or they may be topped by brushing or spraying with a solution of dyestuff of another colour, so as to stain those por tions of the grain surface that have been considerably lightened in colour or renderd white by the buffing. The outcome is a produce a foundation colour on the skin ith a different colour effect on the porons that have been removed by the uffing. Very tasteful effects are thus reduced on calf. East India kips, poulders or sides.

MARBLED LEATHER

Quite a large variety of leather with the latter marbled or mottled appearance produced. Perhaps the oldest method graducing marbled effects is a form of enting with a sponge that has been dippetral a suitable dyestuff solution; the senge being dabbed over the prepared prince of the leather, leaving an impressing of that portion of the sponge surface buth has come into contact with the other. It is usual, to dab the leather or with different sponges dipped in mous coloured solutions, so as to bring pour a mottled coloured effect.

Sometimes the process is varied by scharging the colour from a dyed other by sponge-dabbing with an agent puble of effecting a discharge. As an ample of this, if a leather, stained a dark own colour by the employment of a sestuff in conjunction with a weak iron lution, is then spongedabbed with a sotion of dilute oxalic acid, this will scharge the iron and leave a marbled on a lighter colour ground where the onge has been applied.

It is possible by this somewhat crude it is method to produce quite a to of artistic effects which render the particularly suitable for making number of fancy leather articles.

BATIK MARBLING

d originally from Austria. This siled leather production, which was been a couple of decades ago, like products of a novelty character, has

been allowed to go into disuse, but has recently been re-introduced in both the old form and also with improved results.

After the usual processes of preparation and striking-out, the method of treating the leather consists in pleating or puckering it up into folds by hand, and the skin is then dyed in the pleated or puckered condition. Several methods are in use for carrying out the dyeing process.

- (1) The skin, after being uniformly pleated, is placed in a small wooden trough or box fitted with a perforated bottom. sufficiently large to take the skin comfortably in the folded-up condition. The dyeing is done by pouring the dyestuff from a jug or some other convenient vessel over the skin whilst it lies in the trough. The dyeing must, of necessity, be done very rapidly, and in consequence it is advisable to use a basic colour. After a lapse of a few seconds the skin is removed from the box and immediately washed out. On account of the folds into which the skin has been pleated, the dye solution is taken up. unevenly: the various tints, however, blend into each other, and the result is a somewhat pleasing effect.
- (2) A more recently introduced style of batik marbling, in which an attempt is made to produce a more regular pattern and at the same time a result which resembles a flower design or print, is known as Dahlia or Marguerite marbling. This effect is produced by pleating the leather -usually skiver, thin Persian sheep, or East India goatskin-by pushing the skin at regular intervals through a perforated plate possessing either square, round, or hexagonal holes of varying diameter (according to whether a small or large flower is to be imitated), and then spraying the leather with a suitable dyestuff mixture, whilst it is held in position by the perforated plate or wooden board. through which it has been pushed. The

small pleat occasioned by pushing the leather through the orifice bring about a simulation of flower petals, and some very pretty and tasteful effects can be obtained by this means. Variations of procedure result in different effects.

It is obvious that by pleating or puckering the leather in various ways, and by the use of the spray, considerable variation of different novel effects of this type can be produced, especially when two, three, or more colours are employed. For example, varied effects can be obtained by pleating the skin in different ways, and spraying with one colour from one side of the pleated skin, then spraying with a different colour from the opposite side.

SPRINKLED MARBLING

From time to time there have placed on the market sprinkled leathers, chiefly for book-binding purposes. A skin that is to be sprinkled is usually dyed a pale shade of brown, and sprinkled with a weak solution of ferrous sulphate. The skin is laid on a slightly inclined table, and the sprinkling is done from a brusha painter's large sashool being a serviceable brush for the purpose. The brush is dipped into the solution, and then all surplus liquor is well beaten out of it. Holding the brush over the skin with his right hand, the worker strikes it against a stout stick held in his left hand, in this way causing a fine spray of the iron solution to fall upon the skin. By continually moving the brush and continually striking the spray is evenly distributed over the skin. The application may be varied by spraying the dye or iron solution on to the leather by means of either a hand-spray of the scent spray type, or by a pressure-spraying machine.

A variety of coloured effects can be produced in this way, employing coal-tar colours and sprinkling with two, three or more colours.

BRONZED LEATHER

For fancy purposes, and for childre slippers and ladies evening shoes in pacular, there is a demand for leather has a metallic-bronze surface. The broeffect is brought about by accentuating natural tendency to bronze common many basic colours.

In order to produce a full broadfect; it is necessary to apply the dyst to the leather in a very concentration, dissolving the dye in methyla spirit, and then applying the solution the leather, as in ordinary staining, we a sponge, brush, or by spraying.

Those dyes which have the gier tendency to bronze when used in order, dyeing or staining are the most suital for obtaining the bronze effect; the micrommon of these being Magenta a Safranine, which produce a greens bronze. Methyl violet produces yellowish-green lustre, Methylene bligives a copper-coloured bronze, a Bismark brown a golden-bronze.

It is advisable in the case of leath that is to be bronzed, first to stain or d the leather a dark colour. A black diblue, or violet dyed leather is the my suitable to work upon for the broweffect.

A very strong dye-solution is new sary in order to obtain the desired we sity of bronziness. The bronze that produced on the surface of the leather loose in its very nature, and unless this easily rubbed off. The fix to of the colour is usually achieved by the addition of shellace to the methy spirit mixture, or by the application of waterproof finish to the leather of bronzing—as, for example, a cellule of shellac finish.

For bronze effects the following ricipes may be taken as typical:—

GREEN BRONZE

Magenta	12	ozs.
S. Lanine	3	ozs.
R. by Shellac	10	ozs.
Visthylated Spirit	1	gallon

COPPER BRONZE

Nahylene Blue	10	ozs.
mark Brown	2	ozs.
shellac	10	ozs.
Siethylated Spirit	1	gallon

the mixtures should each be placed n a bottle, and kept in a warm room until t, regredients are completely dissolved to bottle being occasionally shaken.

GOLD AND SILVER LEATHER

there is an occasional demand for all and silver leather for certain purposseach as shoe uppers for ladies' evening tess shoes, theatrical purposes, and there is also a limited employment of goldnated leather in the fancy leather goods adastry and for decorating purposes, ockbinding, etc.

For the very highest quality gold and her leathers, actual gold and silver are in loyed; for commoner class leathers, in the powders are used. The leather the decorated is usually highgrade material such as glace kid in the case of shoe others, and East India sheep or goat or and roan leather for the cheaper material.

The leather to be decorated is to eliminate the maximum amount to eliminate the maximum amount to eliminate the maximum amount leying at a high temperature. The sized with gold size, usually inghtly snuff-buffing, and the gold elver leaf is applied by means of a flat

camel hair brush, in exactly the same way as the gilder applies the leaf to picture frames, etc. The leather is finally sized with a transparent shellac or cellulose varnish after drying.

The advantage of gold and silver when applied in leaf form is that it is practically unaffected by atmospheric influences in wear, whereas the cheaper product the bronze powder is liable to considerable discolouration within a very short period of time.

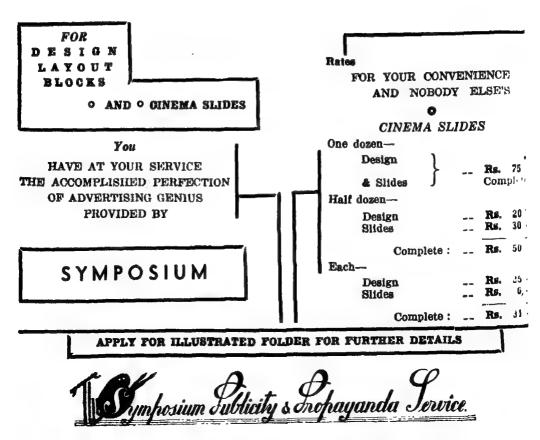
APPLICATION OF BRONZE POWDERS

As stated above, bronze powder is a much cheaper substitute for actual gold or silver. The bronze powders generally used are aluminium powder for silver bronze, and ordinary gold bronze powder for gold effects. The latter is a copper alloy, and in consequence of this and the liability of this material to tarnish by contact with grease, and also the fact that with surplus tannin the copper undergoes decomposition and conversion into copper acetate, which is green salt, the utmost care is necessary in the preparation of the leather before employment of these powders, with a view to eliminating the occurrence of this defect. The leather should be thoroughly washed free from surplus tannin, and should preferably have been degreased by employment of the ordinary benzine method of degreasing. No oils or fats, with the possible exception of mineral oil, should be employed for the purpose of lubricating or fatliquoring the leather, and if required to dye the leather a ground colour, basic dyestuffs should be used for preference, without the use of other organic acid. It is also an advisable precaution that the goods should be thoroughly well washed after dyeing, so as to remove any surplus .dye; a much more efficient washing being necessary than after the ordinary dyeing process.

The leather is then dried, and the decoration with the "silver" or bronze powder is best done by spraying the leather with a celluloid varnish made by dissolving celluloid clippings in amylacetate and alcohol; the powder being mixed to the required consistency into this cellulose vehicle, so as to make a suitable paint which can be satisfactorily sprayed on to the surface of the leather.

It is advisable, after giving a good coating of the bronzing fluid, to allow the leather to become thoroughly dry, drying at a comparatively high temperature, so as to remove the last traces of the cellulose solvent, and then attach the bronze rac firmly to the leather by spraying over we a shellac or clear cellulose varnish.

The addition of hygroscopic a jet like glycerine to the cellulose or shell varnish should not be made, and the statemary addition of castor oil, with a set to producing a greater amount of pliable should also be omitted, especially in a case of gold or copper bronze. This is very short time will bring about the statement of the statement of the golden brown into a dull green colour.



22. R. G. KAR BOAD, CALCUTTA - 4.

-Removal of Stains from Fabrics.

BRICS used in our daily life are made com materials such as cotton, silk, wool utificial silk. These fabrics often stained with substances such as oil. on ohee, fats, fruit juice, tea. coffee. ron rust, paint, varnish, iodine. I mildew, perfume, etc. These stains he removed without damaging the But there are some stains which be removed and are, therefore, e lest alone. Ordinary stains such as stated above can be removed by the cation of the correct reagent, and this , furn depends upon ascertaining the rance causing the stain and the matefrom which the fabric is made. If the and dyed it is also necessary to know. der to remove the stain without reng the colour of the dyed fabric, her the dye used is fast or fugitive. an reagents which can be safely used comoving a particular stain from a n fabric, if applied on silk or wool, lamage the cloth. Then again it must one in mind that fresh stains can be easily removed than old stains and, fore, efforts to remove the stain i be made as early as possible. In case, the cloth should be washed hot soap solution immediately on vering the stain. Several stains can oved easily by the mere application on soap solution, or by holding the with on an empty vessel and pouring I hot water from a kettle on the 1 spot.

the cause of the stain is not known anot be identified then much diffiall be experienced in selecting the le reagent for removing the stain. it cases, it is necessary to carry out ! trials with different reagents which sitable for the nature of the fabric. : material from which the fabric is JL. XLII. No. 495.

made is not known, it is necessary to conduct a simple test. Some fibres may be taken out from the fabric and held in the hand and the gentle flame of a match applied to them. Cotton and artificial silk will burn rapidly, giving a smell of burning paper and leaving a little ash. Wool and silk will, on the other hand, burn rather slowly, emitting a disagreeable smell of burning feather, and have a black bead at the end. If the fabric is dyed, trials will have to be carried out with different reagents or hot soap solution on a corner of the fabric to ascertain whether the colour is fast or fugitive. In some cases, it will be found that the stain cannot be removed without removing the colour of the cloth at the same time.

Stains are removed by different methods of treatment such as solvent, chemical and absorption.

SOLVENT METHOD

In this method the stain is dissolved so that it may pass from the fabric on to a blotting paper placed underneath the fabric. The stain is absorbed by the blotting paper and the solvent in the fabrics evaporates. Before proceeding to remove the stain, the portion of the fabric which is stained should be washed in hot soap solution in preferably a solution Igepon T Soap. The fabric should then be dried.

Now a pad consisting of a few sheets of blotting paper, is placed on the table and the cloth containing the stain laid on the top of the blotting paper. A small quantity of the reagent is poured in a small cup. A clean cotton muslin rag is then dipped in the reagent, the excess quantity squeezed and the rag pressed gently on the stain from the outer side of the stain to the centre. The solvent will carry the stain into the blotting paper. At every

application of the solvent, a clean rag and is tresh blotting pad should be used. The excessive use of reagent at every application should be avoided, in order to prevent the formation of a ring around the stain. The portion of the cloth stained may finally be washed in cold water. In removing stains, the rag dipped in the reagent should be pressed gently but not rubbed on the fabric, as it will cause the dissolved stain to spread out on the fabric. In some cases more than one solvent will have to be applied in succession in order to remove the stain. As many of the solvents are inflammable, they should be kept at a safe distance from any flame.

CHEMICAL METHOD

In this method, the stain is decomposed or bleached and the chemical removed by washing. Before proceeding to remove the stain, the portion of the fabric which is stained should be washed with hot soap solution. The solution of the chemicals is first poured in a small cup. A white cloth is placed on a table, and the fabric containing the stain laid on the cloth. A clean cotton muslin rag is then dipped in the solution and the rag pressed gently on the stain. After the stain has been removed, the fabric is washed in cold water to remove the chemical.

ABSORPTION METHOD

This method is applicable only in the case of grease and lubricating oil stains. As magnesium carbonate has the property of absorbing oil and grease, it is rubbed on the stain and left until the oil is absorbed, and then brushed off. For removing old stains, powdered magnesium carbonate is mixed with benzol (not petrol) and then the paste is rubbed on the spot and allowed to dry and brushed off. This is useful on heavy garments such as coats.

HOT APPLICATION

This mehod is applicable in the case of stain produced by rain-water an

silk fabrics. A white cloth is laid on the table, and the stained fabric is placed over it. A wet cloth is then placed on the stained cloth, and a dry cloth is placed over it. A hot iron is pressed on the cloth in order to remove the stain.

- 1. Nature of stain—Milk, butter ghee, vegetable and animal oil and fats.
 - Cloth of fabric—Cotton, silk, woo and artificial silk. Reagent in bused—Carbon tetra chloride. Met hod to be adopted—Solvent.
- 2. Nature of Stain—Tea, C fee Cocoa. Chocolate, Fruit juice, vin and bear.
 - (a) Class of fabric—White conton and artificial silk. Reagent to be used—Sodium hypochlorite solution (1 oz. of sodium hypochlorite in 10 oz. colowater). Method adopted—Chemical.
 - (b) Class of fabric—White olk wool and coloured cotton and coloured cotton and coloured artificial silk. Reagents to be used—Ameroni solution (1 oz. ammoni i 5 oz. water) followed by hy drogen peroxide (12 cold strength).
 - (c) Class of fabric—Coloured sile and wool.

 Reagents to be used—A: and nia solution (1 oz. amu.oni in 5 oz. water).

 Method adopted—Chemic l.
- 3. Nature of stain—Ink and .ro rust.
 - (a) Class of fabric—White co to and artificial silk.

 Reagents to be used—Ho oxalic acid solution (½ 02 Oxalic acid in 16 oz. of water) followed by sodium hypochlo

rite solution (1 oz. in 10 oz. of water).

Method adopted - Chemical.

(b) Class of fabric—Coloured cloth and artificial silk.

Reagent to be used—Hydrochloric acid (1 oz. acid in 15 oz. water) followed by washing and then treatment with ammonia (1 oz. ammonia in 5 oz. water).

Method adopted—Chemical.

(c) Class of fabric—White silk and wool.

Reagent to be used—Warm oxalic acid solution (½ oz. oxalic acid in 16 oz. water) followed by washing and then treatment with ammonia (1 oz. ammonia in 5 oz. water).

Method adopted—Chemical.

Nature of stain—Iodine.
Class of fabric—Cotton, silk, wool and artificial silk.

Reagent to be used—Sodium thiosulphate solution (1 oz. thio-ulphate in 5 oz. water).

Method adopted—Chemical.

 Nature of stain—Grease, tar and wax.

'lass of fabric—Cotton, silk, wool and artificial silk.

Reagent to be used—Coconut oil followed by hot soap washing and then treatment with carbon strachloride.

Method adopted-Solvent.

Nature of Stain—Paint and

Class of fabric—Cotton, silk, wool and artificial silk.

Reagent to be used—(1) Methylated spirit followed by turpentine and soap washing finally after drying.

(2) Carbon tetrachloride.

- (3) Mixture of acetone and amylacetate (1 oz. acetone and 1 loz. of amylacetate).
- 7. Nature of stain-Blood.
 - (1) Class of fabric—White cotton and artificial silk.

 Reagent to be used—Sodium hypochlorite solution (1 oz. in 10 oz. of water).
 - (2) Class of fabric—Wool and silk and coloured cotton and artificial silk.

 Reagents to be used—Acetic acid (2 oz. concentrated acetic acid, ½ oz. Common salt in 19 oz. water) followed by washing and treatment with ammonia (1 oz. of ammonia in 5 oz. water).

Method adopted—Chemical.

- 8. Nature of stain—Mildew.
 Class of fabric—Cotton, silk, wool and artificial silk.
 Reagent to be used—Hydrochloric acid (1 oz. in 15 oz. water) followed by wash and treatment with hydrogen peroxide (12 vols. strength).
 Method adopted—Chemical.
- Nature of stain—Perfume.
 Class of fabric—Cotton, silk.
 wool and artificial silk.
 Reagents to be used—Ammonia
 (1 oz. in 5 oz. water) and oxalicacid in 16 oz. water), alternately.
 Method adopted—Chemical.
- 10 Nature of stain—Perspiration.

 Class of fabric—Cotton. silk, wool and artificial silk.

 Reagent to be used—Hydrogen peroxide (12 vols. strength).

 Method adopted—Chemical.

In preparing hypochlorite solution take 1½ oz. of soda ash and dissolve it in 5 oz. of cold water. Then take 2 oz. of bleach-

ing powder (containing 35 p. c. available chlorine) and dissolve in it 15 oz. of cold water. Mix the two solutions, stir and have it undisturbed for 20 minutes. The clear solution is sodium hypochlorite and this should be poured into another vessel without disturbing the sediment. As the sodium hypochlorite solution is not stable, it should be prepared fresh evrey time.

In conclusion it is not out of place to mention the whole list of chemicals 'o be stored in carrying out this business.

Methylated spirit, acetone, amyl acetate, carbon tetrachoride, turpentine, coconut oil, soda ash, liquor ammonia, (coot vols.), bleaching powder, acetic acid oxalic acid, hydrochloric acid, sodiun thiosulphate.

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-BENGAL HOSIERY INDUSTRY

HE first hosiery factory in Bengal and started in the 1890 at Kidderpore the Municipal Wards of Calcutta. and by the establishment of a bigger in the year 1892, at the same place. jull contingent of British machinery Bitish experts at the initiative and ... the management of some of the i interprising citizens. During its of the past 61 (sixty one) years adustry has passed through many . "ides. While on the one hand it ar doubtedly received impetus for proas a result of events like (a) politimheavals in the country followed by · Swadeshi" movemetns (b) two world wars and (c) protective ones against foreign imports taken by Covernment, it has on the other hand plenced severe set backs, which have times shaken the very foundations of industry and have swept away many ctory from their existence. Some of · plyerse factors were (a) change vorld conditions, which prevented itition of its numerous essential (b) long period of competichean and " ith the area imports and (c) occasional is trade depressions caused by various

sounder the shadow of the unfair competition from Japan in the 1923 that this Association took its

birth. Since its inception it has naturally identified its existence with that of the industry and plunged headlong in the act of forging its destiny. But for the two outstanding achievements the industry would not be what it is to day. Through the initiative of The Hosiery Manufacturers Association and its sustained efforts for years by various deputations and representations to the Government of India and the Tariff Boards of 1926. 1932 and 1935 the necessity of assistance to the industry was impressed on the Government, which adopted effective measures of protection by two successive legislations in 1934 and one in 1935. Then again during the last great war, when in the name of all-out war efforts, the then India Government practically stopped the supply of yarn to the industry for civil purposes, the Association undertook Government orders and kept working throughout the war period most of the medium-sized factories under its membership, which would otherwise have closed down for want of raw materials.

The position of the industry in West Bengal at a glance during the last twelve years is given below. There being no authentic statistical records available the following figures have been worked out on the informations collected privately as an workable basis:—

PROBLEMS

		1938	1949.		1950.	
Complete or Composite factories knitting machines installed hoslery sewing factories	Not	250 1,500 ascertained	314 2,000 500		430 3,000 500	
of socks factories worked by manual adour them in Block Capital	Not	150 ascertained	250 Rs. 2 Rs. 6	Crores .	250 3 7	Crores
installed—Quantity (in lbs.) —Value (in Rs.)	1. be	. V	168 756	Lakhs	252 1,134	Lakhs "

3. Consumption of finished products in	West					
Bengal—(a) Quantity (in lbs.)	\$1173.00	Pa	17	18		18
(b) Value		fu.	19	81	24	81
9. Exportable surplus of finished	goods			470		
(a) Quantity (in Ibs.)	*****		49	150	fa .	234
(b) Value (in Rs.)	*** **	Po	11	675		1,05:
10. Workmen employed	*******	BTo4	6,000	10,000	p=	10,000
11. Wages paid per month		Not	ascertained	7 11	4-	7↓

In dealing with the problems of the industry it would be necessary to bear in mind some of its inherent difficulties owing to its being a typical medium scale industry-unlike cottage industries, where simple and crude machineries and equip-This industry ments are employed. requires various types of complicated machines requiring precise adjustments. Its raw materials are not primary products as are easily procureable but are them. selves the products of some big scale industries viz, yarn, sewing thread, bleaching chemicals, starch, dyestuffs, etc. Some of these materials including needles and sinkers are imported from abroad and are thus subject to occasional short supply and speculative prices. Like the big-scale industries it requires highly technical services for erection and maintenance of its machinery but most of the units being very small in size cannot afford to maintain their own technical staff. Consequently the entrepeneur, who have to look after all the departments of their factories personally viz, management, supervision, finance, technical service, dyeing and bleaching and marketing, have invariably to work under constant and heavy strain.

These factories therefore are very weak in their power of resistance and are liable to succumb easily to any strong extraneous forces of adverse circumstances. The services of a strong responsive and active Association are certainly helpful to them but for their proper maintenance and development the fostering care of a national Government is essential.

CONTROL

The present problems of the industry

have been mainly created by the shortal of its raw materials and the controls it posed on it. The committee is not oppose to the principle of control. Compulso apportionment of available raw material among the factories on equitable basis unavoidable so long as its scarcity connues. But our grievances are with rotate to the administration of the control both in respect of Procurement as Distribution.

PROCUREMENT

the procurement of yain A_{s} administered by the Central Governme the Association have been negotiating a along with the Industries Ministry at particularly with the Textile Commission for increasing the monthly quota of co yarn for West Bengal. They have alive pleaded their inability to increase the ply on the ground of shortage of care The Association proposes that t curtailment in the supply of raw matter due to shortage of cotton, in respect of sections of the Indian Textile Indishould be in equal proportion as compa with their normal consumption during particular period when the probleof scarcity of cotton did not appear

DISTRIBUTION

It is not difficult to imagine how continued short supply of raw materalmost on a starvation level, is seriest affecting the industry. It is proving to much for the management of the sale factories to carry on any longer under the present distressing conditions in additional to their inherent difficulties explain above.

The necessity for a more tender and siderate handling of the factories by Covernment is becoming more and sential. Every care should be in to avoid such steps as would involve Not suspension of issue of yarn either mount of protracted inspection or extion or on the ground of some and lapses on the part of some facor other. Rigid pursuit of the letters ander or enforcement of strictness hardine without being tempered with coble leniency may prove fatal to ctories. Any rule or order, affectby long practices in the trade, should edited. Factories failing to submit enthly Application cum Declarahe the 15th of any month should not be penalised by the cancellation of their full quota for the month.

The permits for monthly quotas have seldom been issued regularly. The intervals sometimes extend to 6 or 7 weeks, resulting in longer idleness for the factories. Shortage in the allotment, due to mistake in inspection reports or other reasons, is not often restored for period. Many important affecting the vital interest of some factories remain unanswered for a long time obviously due to indecision. The measures taken by the Directorate in the matter of distribution of Egyptian yarn during the previous 3 allotments resulted in huge accumulation and maldistribution of the yarn.

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-PHARMACEUTICAL RECIPE

COUGH BALSAM

Oil of anise	15	min.
Liquid extract of liquorice Syrup tolu		fl. oz.
	10	fl. oz.
Simple syrup to make	1	pint.

Melt the lanolin and incorporate in hit methyl salicylate. Remove from the sping heat and add the menthol dissolved the chloroform. Finally mix the sapontal water. Stir thoroughly and then put to the

PHOTOGRAPHER'S OINTMENT

The following protects	the	hands	from
photographic chemicals: -			
Dout could never to 0			

Best	castile	soap,	in	filne
------	---------	-------	----	-------

shavings	1	ounce.
Water	1	**
Wax	1	an .
Ammonia	45	minims.
Lanolin	1	ounce.

The soap is dissolved in the water beated for that purpose, the wax mixed in with much stirring, and, when all is in solution, the ammonia is added. When clear, the lanolin is put in, and then, if the mixture is very thick, water is added until the whole has the consistency of honey. Keep in a covered stoneware jar. The hands should be first washed with ordinary soap, and then, while the leather is still on them, a bit of the mixture about the size of a hazel nut is rubbed in until all is absorbed, and the hands are dry. At the close of the work, the film of wax is washed off in warm water and a little lanolin rubbed into the hands.

SORE THROAT TABLETS

Potasium Chlorate	•		10	grains.
Sugar			80	
Borax	•		8	8.8
Eucalyptol			0,125	10
Thymol			0.500	64
Menthol			0.025	10
4 4 4 4 4				

Add glycerin and distilled water to make a paste. Mould and dry. The above composition enough for 200 tablets.

ANTI-ACID STOMACH TABLETS

Sugar	1	1b.
Calcium Carbonate	1	
Pappermint essence	2	drams.

Mix sugar and carbonate with 1½ pints of water and boil until mass will set on a cold spoon. Cool and add 2 drams of essence of of Peppermint while stirring is still possible. Spread thin over a flat pan and cut into ½ inch cubes.

ANALGESIC BALM LINIMENT

Methyl salicylate	30	parts.
Menthol	10	90
Saponin		part.
Lanolin	321	parts.
Chloroform	5	9
Water	100	98

SULPHATHIAZOLE OINTMENT

Anhydrous Ianolin 47.5	
Sulphathiazole, finely divided 5	
Vanishing cream or potassium	
stearate 47.5	

Melt the lanolin and add the vecream slowly with adequate heating, was produce a good fluffy cream. Add the vely divided sulphathiazote and continued inguntil a uniform mixture is obtained to mixture is readily emulsified, add to four drops ethanolamine and continue heating.

This continent is particularly ado to various skin irritations, eczema, and to skin diseases.

RINGWORM OINTMENT

Salicylic acid	2	ē,
Creusoto	1	H
Resorcin	1	4,
Renzoated lard	4	,
Triturate the ingredients in a temperature the lard and then pack in pots.	1101	fur

AGNIMUKA CHURNA

Asafoetida	1	i
Acorus calamus	2	1
Long papper	3	
Ginger	4	
Ajowan	5	
Chebulic myrobalan	6	
Plumbago root (Chitramula)	7	

Reduce the ingredients into powde and pass through a cloth.

Dose: 20 to 40 grains with whey.

PIMPLE LOTION

	•
Crystallised alum	1
Sodium chloride	1
Sublimed sulphur	1
Sugar candy	2
Spermaceti	2
Elder-flower water	3
Distilled water	3
Brandy	10

Reduce all the solids into fine power to up with the mixed liquids. This is to be applied at intervals during the desirable rags, which should frequently be consistent and quick remedy for consistent on the face.

-Recipes for Small Manufacturers

CAMPHOR ICE

Propher ice contains 10 to 25 per cent, of propher, which is added to the melted fats a trief have dissolved. It is then poured moulds and the blocks wrapped in tin foil.

comphor powder	150	parts,
(resine, white	60	**
Hate paraffin	250	93
Seft paraffin, white	500	**

WOOD LACQUERS

V-nylacet ate	d gallon.
Bifyl acetate	1 "
P 'vl alcohol	1 ,,
r bol	1‡ gallons.
s Pac solution spirit	d gallon.
Vitio cellulose	61 lbs.
t tyl phthallate	1b.
Vict in a stoppered vessel	and keep aside
Ps olve.	

MUKHBILAS

Coriander seed	1	tola.
\ni40ed	1	19
Par-Toy	1	10
Numer	1	
Version .	1	12
officer.	1	
code of cardamom major	1	19
of cardamom minor	1	
t loves	1	
Ilis rose petals	1	27
Chin	1	29
Couphor	1	

The last two and soak them in good rose of 12 hours. Then bray them together form and incorporate chua and

LACQUER FOR SHOE HEELS

to these acetate	12	parts.
Acciena	1152	99
11 001	14	89
gol alcohol	3	
le istrial spirit	7	g _a
· clin	10	44
in a stoppered bottle		

POLISHING CLOTH

le acid	1 lb.
:-:ine	1

together, remove from fire and add or methyl salicylate or terpineol, i oz. totton fiannel into desired size, dip in oure till thoroughly saturated, then run a tight wringer. Fold and wrap in

LEMON SQUASH

Lemon squash is made with the expressed juice of lemons to which suitable amounts of sugar and water are added; occasionally a little lemon oil is added to flavour. The lemon juice for this purpose is obtainable packed or cloudy, the cloudiness being due to the presence of pulp which floats in the liquid.

Orange squash is made in the same way

from expressed juice of orange.

Water

LEMON SYRUP

It is made with tincture of sweet orange peel and oil of orange.

	į.		
Oil of lemon		2	minima
Alcohol (90%)		- 4	02.
Dissolve and add	kieselguhr	_	
(or kaolin)		1	dr.

Allow to stand a day or two shaking occasionally; filter and add to a syrup made as follows:—

4711		OZ.
Citric acid	1‡	dr.
Water	7	0%.
The oil of lemon and alcohol may	be	replac

ed by 1 oz. of tincture of fresh lemon peel.

Oil of lemon	2	dr.
Otto of rose	2	m.
Alcohol (90%)	2	07
Citric acid	3	12
Syrup	2	gal.
Prepare as above.	_	Guar

SILVERING POWDER

Silver chloride	1	tola.
Common salt	11	tolas.
Washing soda	3	
White chalk powder	21	AR

Powder each separately and weigh in a well dry condition and mix well the whole and pack it in 1 oz. size screw top or wide-mouthed cork bottle.

For silvering the articles made of brass, copper, German silver, etc., first clean them well with chalk powder and wash with clean water. After cleaning the article from dirts and traces apply this silvering powder with a small piece of clean cotton rag when the article is wet. Rub briskly all over the place with this powder for some time and wash with water. Two or three coats in this way will give a good deposit of silver on the articles. To get cleaner and brighter surface on the article it must be cleaned thoroughly before applying this nowder.

-IN THE FIELD OF INVENTION

ONE MINUTE ALLOY ANALYSIS

An automatic photo electric instrument capable of obtaining the complete chemical analysis of an aluminium alloy in less than one ninute, and producing a written analytical report in duplicate, was described recently by Mr. J. R. Churchill. of the Aluminium Comany of America. The instrument, called a uantometer, is able to provide a true control nalysis, in as much as analysis can be perormed, while the aluminium is being processd. and concentrational adjustments can be nade immediately if the product does not meet pecifications. Where high uniformity of prouct is required to meet the exacting needs of uch customers as the aircraft industry, the utomatic instrument produces faster, less exensive and more reliable test results than btained by laboratory technicians.

-CHEMICAL AGE.

IEW U. S. TINPLATING TECHNIQUE

Savings of up to 50 per cent, in the use of in are claimed for a new tinplating techniquo ecently perfected by the Weirton Steel Commany, West Virginia. Under methods in general use, tinplate receives the same weight of conting on both sides. In the weirton process one ide is coated sufficiently to protect the contents of the can, while the other side is treated with only the amount of tin necessary to procet the exterior from exposure.

-CHEMICAL AGE.

IEW SULPHUR RECOVERY PROCESS

Recovery of elemental acid grade sulphut rom surface deposits by a new refining process s reported by the Chemical Construction Corloration, New York, a subsidiary of the Amerian Cyanamide Company.

The method involves the grinding of native ulphur bearing ores to below 28 mesh size and uspending the finest in water. The mixture is hen heated to above the melting point of subtur to separate it from the gangue. After cooling, the final mix is subjected to froth lotation. Sulphur is floated off with the froth and filtration yields a product ready for acid nanufacture. Relatively simple equipment comparable with the well-known French process employed and an effective sulphur recovery if 90 per cent. or more is claimed.

Should Chemical Construction Corporation's new process live up to its preliminary expectations it will spell the utilisation of large surface deposits of sulphur bearing ores hroughout the world, and it should prove considerably cheaper than a pyrites acid plant is a sulphuric acid producer.

-CHEMICAL AGE.

VIBRATING TABLE

Containers of all shapes, size, and make rials can be effectively vibrated with the Kok Vibrating Table.

The table is of all-steel construction. The table top is securely bolted to moulded and the mountings which isolate it from the base vibration is not transmitted to the form of the machine. An unbalanced weight rotar of the machine. An unbalanced weight rotar of the small electric motor causes the vibration of the vibrator is secured to the table top by the mountings to eliminate "contact rattle". The surface of the table is slightly dashed to be containers sliding off, and is covered we refer to eliminate noise.

-CHEMICAL PI 15

HOT AIR OVEN

A new type of hot air oven, design ally Electricals Ltd., has just been announced Difficulty in the past has existed in object as very close temperature control but it is closed that this oven, by reason of its design at the struction, virtually eliminates this trouble

Temperature range of the oven is analysis to 300°C, and it can be used for any temperature within these limits. Internal many is ments are 17 ins. cubs.

A thermostat control gives the desired to perature at all parts of the oven to without it per cent, with shelves loaded, althourn the limits are finer than this for any one perf. This very close temperature control is obtained by special features the principles of these loads a hot air bath surrounding the interior and the air is circulated by effective, in which the air is circulated by effective, and additional fan agitates the air in the load interior. The heat insulation is such that the exterior of the oven remains cool at all these

Due to the unique air bath principle (sed it is possible to avoid switching the whole back of heating elements on and off throug' thermostat circuit, a system which invariable gives rise to great fluctuations in the over the small wattage controlled by the their conditions the extra elements controlled by a tion rotary switch when required to attain had temperature, provides very small temperature fluctuations.

A warning light to indicate failure of the fan, and a pilot light on the thermoston as fitted on the control panel.

The oven is useful for all laborator. PM poses and is ideal, by virtue of its temperature control, for the sterilization of syringes.

-CHEMICAL PRO CIS

-FORMULAS, PROCESSES & ANSWERS

AN ALING SIGNBOARDS

332 V.A., Madura—Desires to know the feet of enamelling signboards.

il enamelled wares receive first a coat of , namel-the fundamental coat, since on to be placed the future colours-consist-, willy of a coating of glass. This operation cayed by a coating of white or glazing the colour being afterwards laid on the signboard plates, after being levelled or Tar are bevelled, and dipped into a bath of mailbric acid composed of equal parts of : ... I water. They are next heated to redness if the scale, and cleared in dilute sulphuand; then rinsed in cold water well scoured sand, again rinsed, but in boiling water, it iwards dried. The enamel mixings are and there in the form of a powder or as a the latter for preference. The remarks is poured over the plate, or the plate into the liquid, any surplus being and with a cloth. The first or grey coat is it 160°C and is afterwards fused at a evoled to a white heat about 1200°C this done in a muffle furnace. This first coat many impressed or fused into the body of the the thus obviating cracking or pecling off. It based to cool slowly and uniformly. The at coat of white is then applied. It must be is liquid as possible, and fused at a lower and ture, about 1050°C so as not to interfere the first grey conting. The coloured coat-· choroughly ground up, well mixed, fused a uitable crucible, and run into cold water asselver them brittle and easy to grind. After v. they are reground very fine. The grindwill is of a special character, so constructed tory particles of iron are prevented from 112 into contact with the material being ed, as the iron would cause distinct dis cration. The grey mixing should be kept in saltion just liquid enough to pour, a suitable ally of water being added only when the or and kept in covered tubes till used. The values be well protected from dust. the points to be carefully followed are: t of the clean the plates before use. Fuse and such a heat that it may only coat the the and eat its way into the surface of the id: this is only done at a white heat, and at - . . temperature than the white, so that it and be altered when applying the white. suppositions have the same capacities for ion and contraction as the metals upon they are applied; but a most important slow and uniform cooling. The composithe various glazes is as follows: The olde of lead 47 parts, fused borax 4 parts. ' Quartz, 671; borax 291; enamelling soda 3, Silica 65; borax 14; oixde of lead 4; clay, agnesia 2 No. 4. Any kind of glass 61; red-.1. 22; borax 16; nitre, 1. The white ground— 11. Felspar, 33; borax 22½;; quartz 16½; oxide in, 15; soda 8; fluorspar, 3½; saltpetre, 2½.

No. 2 Cullet, 20; lead 52; arsenic, 4½; powdered fint, 15; soda, 4½; nitre 4. No. 3 Silica powder 30; borax 17; oxide of tin, 18, soda, 8½, nitre 7½; white-lead, 5½; magnesia, 4; silica powder 4. For the various shades or colours, the following are used: Blue-silicate of cobalt. Violet—peroxide of manganese. Green oxide of copper, with, if necessary, a little oxide of iron. Naples yellow or orange—red oxide of iron and an antimony preparation mixed to give the desired tint. Red-sulphate of iron and alumina. Brown, black and purple—oxide of iron mixed with a certain proportion of clay. Black-oxides of cobalt, iron and manganese.

RUBBER BALLOONS

13 M.R.I., Jogeshwari—Desires to know a good formula of making rubber balloons.

Toy balloons are made by both straight and coagulating dipping from latex. The latex composition should be adjusted so that the cured film will have low modulous and be free of odour and taste.

Rubber latex 60 p.c.	100.00	lbs.
Zine oxide	0.50	- 10
Sulphur	1.00	
Z. D. C.	0.83	48
Casein sol. 10 p.c.	1.00	0.0
Ciganic colouc	2 to 3	99

First prepare the casein solution by dissolving 10 parts of casein in 90 parts of ammonia for it. Then take necessary amount of this casein solution and triturate in it the zinc oxide, Z.D.C. and colour. Then incorporate the mixture into the latex. Stir thoroughly. Then allow the bubbles to escape and dip the forms after dipping them in calcium chloride solution (Calcium chloride 10 parts, water 40 parts and methylated spirit 40 parts). Take out the forms slowly and then keep them erect to dry. When dry make a neck by pushing.

ROSIN PLASTER

64 V.Y.S., Bijapur - Wishes to have the formula of preparing rosin adhesive plaster.

To prepare rosin plaster first prepare lead plaster in the following manner:—

Litharge	6	łbs.
Olive oil	1	gallon.
Water	1	quart.

Boil all together on a slow fire, constantly stirring to the consistence of a plaster, adding a little boiling water if nearly the whole of that used in the beginning should be consumed before the end of the process.

Now take 3 ibs. of this lead plaster. Warm it and then to this melted mass and rosin in fine powder. 1 ib. also liquefied by gentle heat and mix.

ARTIFICIAL BEESWAY

106 K.A.K., Bangalore—Wants to have a zormula of artificial beeswax.

This is obtained by mixing the following substances, in approximately the proportions stated:—

	Parts	by Weight.
Paraffine		45
White Japan vegetable	Wax	30
Rosin or colophonies		10
White pitch		10
Tallow		5
Ceresine, colorant		0.030
Wax perfume		0.100

If desired, the paraffine may be replaced with ozokerite, or by a mixture of vaseline and prokerite, for the purpose of varying the fusing temperature, or rendering it more advantageous for the various applications designed. The following is the method of preparation: Melt on the boiling water bath, shaking constantly, the paraffine, the Japan wax, the rosins, the pitch, and the tallow. When the fusion is complete, add the colorant and the perfume. When these products are perfectly mingled, remove from the fire, allow the mixture to cool, and run it into suitable moulds. The wax thus obtained may be employed specially for encaustics for furniture and floors, or for purposes where varnish is employed.

RED LEAD

124 A.E.W., Nasik—Wishes to have a good process of manufacturing red lead.

Red lead is prepared on the large scale in 1 furnace with the floor slightly concave and the coof arched, presenting a general resemblance o a baker's oven. The lead in thin sheets free rom iron is placed on the floor, and gradually aised to a red heat, whereby it melts and becomes covered with a pellicle of monoxide, which s removed by means of a long iron scraper, and the pellicles, as they successively form, are craped off until the whole of the metal has seen converted into the monoxide. The proluct is subjected to further heating (calcinaion) in presence of air, with occasional stirrng, for some time, in order to oxidise any renainder particles of metallic lead; it is thus endered yellow, and constitutes lead monoxide, or massicot as it is technically called.

This is taken out of the furnace, thrown tpon a level pavement, and cooled by being prinkled with water. It is next reduced to fine wowder by trituration and levigation. The paste hus obtained is thrown into a cistern full of vater. And then it is stirred by means of a od. It is then set aside for a few minutes the ine particles of yellow lead monoxide settles t the bottom. The clear water is syphoned off nd thrown away. The lead monoxide is taken and dried in the sun or otherwise. The ried mass is then spread thinly in a number of hallow iron trays (about 12 inches square and bout 4 to 5 inches deep). The trays are next laced into another furnace, if the first is to be scharged. The furnace on being filled up with rays is heated nearly to redness (600° to 650°F). hen the fire is extinguished and the furnace is

allowed to cool down slowly. The door of the furnace should be kept open, so that the least monoxide may combine with an additional qualitity of oxygen, and become the red oxide. The is taken out, and, after it has passed through fine wire sieve, it is packed in barrels for the purpose of commerce.

LITHARGE

124 A.E. W., Nasik—Wants to have a process of manufacturing litharge.

Litharge or oxide of lead is obtained pay fectly pure by expelling the acid from no at of lead by exposing it to heat in a platitude crucible; or, still better, by adding 1 100 ammonia to a cold solution of nitrate of ical until the liquid becomes faintly alkaline, and ing the precipitate with cold water, drying and heating it to moderate redness for 1 100

On a commercial scale litharge is may factured by scraping off the drops that form of the surface of melted lead exposed to current of sir, and heating it to a full red to melt out any undecomposed metal. The fused oxide, on cooling, forms a yellow obrownish semicrystalline mass, which results separates into scales; these, when gradual constitute the "powdered litharge" of commence The yellow variety is obtained when the moda is only moderately heated. It is usually called massicot.

AGARBATTI

133 R.V., Dinapore Cantt.—Wishes to Law a formula of agarbatti and also pan ka mosada

Musk		20	gr.
Ambergris		20	- 11
Powdered	benzoin	20	04.
0	camphor	2	14
,,	cinnamon	2	dr.
	nitre	2	10
41	charcoal	4	07.

Make a thin paste with mucilage of the a canth. Sticks are then made by dipping and taking out slowly thin wooden or barded splintes into this emulsion. Dry in the sur and store for use.

PAN KA MASALA

Coriander seed	11 tola.
Aniseed	11, ,,
Parsley	1
Nutmeg	1
Ajawan	11
Saffron	1
Seeds of cardamom major	1 1
Seeds of cardamom minor	11
Cloves	11
Dry rose petal	1
Chua	1
Camphor	14

Take all the ingredients except the last wd and soak them in good rose water for 12 hours. Then bray them together to a paste form and incorporate chua and camphor.

HER DYEING

77 C.P., Gudivada—Desires to know the tag of dyeing leather.

hather is cheaply dyed with water dyes of the dyes. In the case of water dyes the it is dissolved in boiling water and is to the leather with a medium soft brush,

BLACK

or water	1	gallon,
ertic soda	1	02.
osine	12	a 1
remul kellom	12	••

TAN

" water		gallon,
. iic soda	- 1	02,
or brown	1	lb.
the dyes are prepared	chiefly	from
and spirit, acetone, turpen	tine and	d white
this tures of these.		

BLACK

lated spirit	1	gallon.
1 11/9	1	
· black	12	OZ.
oli oli	4	
tan grass oil	4	10
•		**

COLOURED

Toto spirit	1	gallon.
storal oil		pint.
(coloured), oil soluble	6	OZ.
i of mirbane	2	20
Apply with a soft brush.	-	**

RINTING

7 SIS.M., Madras—Desires to know a loi printing tin plate.

modern method of printing upon time is an application of offset printing, the machines may belong to either the the rotary type, but they are built pecial purpose and have their own sites. The tinned plate, does not due in contact with the printing surfus it is carried round with the cylinder in it is fed, it receives an offset impressive rubber blanket fixed upon a second which has already taken a direct print printing surface. As the plates are if y are arranged in racks and kept fiver they may be put into a stone for lying.

printing each plate should be it rubbed on both sides with a duster dirt, grease, etc., which may perhave got upon it, and which, if left, event the ink from printing. Rough also be smoothed, as otherwise the danket would soon be damaged.

the thod adopted is the same as that of paper. The white would be done first, it cover up all parts except those repapear as gold and silver, or any parts a colour is required to appear with a Of course, only transparent yellow is usually printed after the white: it

produces a nice strong buff where it falls upon the white, and a bright gold where it comes upon the bare tin. It may, however, be had of various shades to suit special requirements. It helps to give depth of colour and billiancy to solid reds and other colours. It is an important matter for the artist when drawing the design to take full advantage of the light colours, The black printing would come next, followed by the red and blue. After the work has dried, the plates are varnished and then stoved, after which they are ready for the tin box workers.

As with ordinary offset printing the rubber blanket will require to be washed several times during the day. This should be done with a very volatile liquid such as solvent naphtha spirits of turpentine, or benzoline, and it should be immediately afterwards dusted over with fine flour of sulphur. This treatment will impart to the rubber a fine printing surface.

All designs to be printed on tin should be specially lithographed by an artist with experience of tin plate work. Type matter must be reversed.

DEODORISING KEROSENE OIL

247 G.L. Srinagar-Wants to know a process of deodorising kerosene oil.

Kerosene oil	1 gallon
Chloride of lime	3 oz.
Slaked lime	3 "
Hcl	Q. s.

Mix the chloride of lime with the oil, and add Hel until chlorine gas leaves to be given off, mixing thoroughly. Then pour on to the slaked lime, contained in another vessel, and allow it to remain a couple of days. Then well mix up. Allow the lime to subside, and draw off the petroleum.

COCOA BUTTER SUBSTITUTE

192 A.M.F., Gohi—Wants a formula of cocoa butter substitute.

Lanolin 6 parts.
Spermaceti 3 "
Olive oil 1 part.
Mix the ingredients over slow fire. Then set aside to cool.

COLOURING CELLULOID SHEETS

267 H.N.B., Ahmedabad—Wishes to have recipes of colouring celluloid sheets.

Thin celluloid sheets can be stained superficially, on one side or both sides, by dipping them in a bath of coaltar dye, prepared by pour-

TRADE MARKS & PATENTS

For any difficulty in registration of trade marks & patents in India or abroad Consult:

DEWAN RAJ KUMAR, Trade Marks & Patents Attorney, 78, Poder Chembers, Fort, Bombay.

Phone: 32444. Note: Head office of Trade Marks Registry for India is in Bombay. ing an alcoholic solution of the coal-tar dye into a bath of 99 per cent. spirit containing a small amount of shellac and sandarac, or some other resin. This bath is acidified with boric acid, and shortly before use a little ether is added, to accelerate the drying of the coloured layer on the surface of the celluloid.

The celluloid sheets are immersed for a short time merely, this being sufficient to mordant and colour the surface. The coloured layer dries very quickly. If only one side of the sheet is to be stained, the other is first coated with asphaltum in the usual manner.

CRACKERS

278 N.S., Shiyali-Wants to have a recipe of crackers.

Saltpetra		45	parts.
Sulphur		18	**
Charcoal		25	11
Potassium	chlorate	8	19
Fine sand		4	An .

Mix very cautiously and skilfully; fill tissue paper tubes.

MERCERISING COTTON THREAD

817 B.C., Kalyan-Desires to know a process of mercerising cotton thead.

Mercerising of cotton consists in impregnating the fibres with concentrated caustic soda lye, either with or without the application of tension, and in stretching material before and during the removal of the soda by means of washing. Mercerisation of cotton can be carried out either in the loose state or in the woven condition. Boiling out is of course the first step, although in occasional instances, when dealing with certain qualities of cloth, it is not resorted to. Hanks are boiled out under low pressure, while air passed through a boiling cut machine. Both forms of yarn are occasionally dried up after washing, before being brought into contact with the mercerising liquor.

The principles involved in the control of the mercerising bath are the same for both yarns and cloths. They depend upon the temperature of the bath as well as upon its degree of concentration, and also upon the state of the material wet or dry. When employed at a strength from about 22°Tw. to 56°Tw., and used regularly and continuously at the same strength, the temperature of the bath should not be allowed to exceed 30°C. At low temperatures the strength may be relatively decreased within certain limits. Generally considered, the

[10000p406111131p1p151540508419000841900p40p40p40p400001038411541111411151558141447711p015150**9**49185441131575170348

duration of contact of the alkali with cotton is regarded only as a matter of S. dary importance, excepting in certain ava of treating pieces, when the contact is alle to continue for many hours. For most proa treatment extending over two to five prois considered sufficient to give the maximum results.

After treatment with caustic soda the washing is an operation as important as and should be accomplished while the tie is still under tension. After this source washing follow, especially if the goods are finished and are required for dyeing with other colours than the substantive and se dvestuffs.

After washing, the cotton is dried ... the stretched condition, mercerised yath an appreciably better lustre than when in the loose state. A course of stringspecially constructed machines is also over ally resorted to.

GLAZED THREAD

Silver

Copper

Bring 5 gallons of soft water to -100°F. Then add 1-5 pound of pointe : which has previously been dissolved in water. After thoroughly mixing, add 1 hard paraffin and 3.2 ounces coconut or all is dissolved, empty into clear pails . when cold. Keep the tension of the year the machine as much as possible. T' . help to get a good, soft, brilliant lustre too much tension the thread will be wire

GENERAL SOLDERING FLUX

331 G.S.A., Deheri-Wishes to him. mulas of soldering flux, gold solder. solder, etc.

SILVER SOLDER 40 100 15 20

2ine 18 Cadmium 1 Tin 1 Lead Then Fuse in a fireclay crucible.

oiled moulds to have thin sheets.

GOLD SOLDER

	2000	CLIPPIN		
Gold			25	,
Palladium			2	
Copper			5	
Cadmium			3	
Silver			4	
Zine			1/10	

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REASS SOLDER

D (nA	49	parts.
Zinc Copper	44	97
Tin	2	20
Lead		**

CK DRAWING INK

33 R.V.S., Pindivaram Talug-Desires to va good recipe of black drawing ink. 3 lbs. his whed shellac .. 21 п n black 50 1 . med water

whethe borax in the distilled water and 1 to it the bleached shellac. Keep and a day or until the solution becomes Strain through a fine cloth. Lastly the carbon black in a part of this . - olution and thin the smooth concen-, the the balance of it. Add some prehke boric or salicylic acid 1/10 per

TER COLOUR CAKES

Vist water colours may be prepared by the respective pigments, previously , to powder, into a smooth paste with threshes of isinglass size and thin gum the paste is then compressed into . . , tightly as posssible and dried with ple heat. Old crumbling cake colours the powered very finely in a mortar, mugh fine muslin and ground up as the gum water being omitted. The rabbed up with honey to the consistream, constitute moist colours.

N

" RUP, Ahmednagar-Wants to have and also

ar puls. Tracic acid, triple pressed	200	parts.
potash, sticks	14	13
i the potential servers	750	
cente	50	**
oot, spirit	100	Þo
a anot oil	4	
ora der	2	44
that ylang oil	1	part.
great oil	1	- 40
intige off	5	parts.

Luanium oil dve the caustic potash in one third t the water. Dissolve the glycerine in soring portion of the water. Now put wid in a porcelain or enamelled vessel bath and also put the caustic soluthe remaining water in another two d vessels placed over the water bath ed to 80°C.

the contents of all the three vessels i to about 80°C, the caustic potash is slowly stirred in the melted stearic 1. vigorously for a few minutes and viy add the water. Remove the vessel · water bath to cool but continue stirin the mass is nearly solidified. Now cetial oils in the spirit and add this to haired mass. Cover and set aside, stir onally. In about two weeks the silvery als begin to form.

KASTURI PILLS

Cardamom	10	05.
Cloves	10	-
Cinnamon	10	99
Nutmeg	10	88
Масе	10	-
Cubeb	10	
Catechu	10	
Camphor	1	50
Musk	1/10	.,

Take the ingredients in fine powder and thoroughly mix. Put the whole in a mortar and make it a stiff paste by adding rose water. Bray well for some time. Take this and make it into small pills of 2-3 grains each and dry it in shade.

PHOSPHORUS

390 R.C.P., Dindori-Desires to know a

process of making phosphorus.

The first step in the preparation of phosphorus is to mix bone-ash with two-thirds of its weight of sulphuric acid diluted with water. Calcium phosphate is insoluble, but under this treatment is transformed into a soluble acid phosphate, commonly known as superphosphate of lime. The following equation represents the change which occurs: --

 $Ca_3(P0_1)_2 + 2H_2S0_1 = CaH_4(P0_4)_2 + 2CaS0_4$ Calcium Calcium Sulphuric Calcium Sulphate hydric phosphate acid phosphate

The calcium sulphate is allowed to settle, and then the clear solution of acid phosphate is evaporated down to the consistency of a syrup and mixed into a paste with powdered charcoal. This is dried and then heated to low redness in an earthenware retort, the stem of which dips under water.

The first result of the application of heat is that the acid or hydric phosphate loses its water, being converted into a salt known as the metaphosphate:-

$$\operatorname{CaH_4(P0_4)_2} = \operatorname{Ca(P0_4)_2} + \operatorname{2H_20}$$
 $\operatorname{Calcium} = \operatorname{Calcium} = \operatorname{Water}$
hydric phosphate metaphosphate

The metaphosphate is at the high temperature decomposed by the charcoal; thus:- $3Ca(P0_3)_2 + 10C = P_4 + Ca_1(P0_4)_2$ + 10C0 Calcium Calcium Carbon Phosphorus phosphate monoxide meta phosphate

The phosphorus thus produced distils over, and is purified by re-distillation and squeezing through wash-leather under warm water.

PAPER BAGS

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-READER'S BUSINESS PROBLE

[Reader's business problems will be discussed in these pages. We invite the reader to us his difficulties. As the department is in charge of an experienced businessman will specially adept in dealing with such problems and to whom experiences of a large not successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available.

LIMITED LIABILITY COMPANIES

875 B.B.C., Agra—Wants to be enlightened on the particulars of limited liability com-

panies.

Limited liability companies are divided into (a) private companies and (b) public companies, A private company can be registered by two or more persons if by its articles it (1) restricts the right to transfer its shares; (2) limits the number of its members to fifty; and prohibits and appeals to the public at large to take up shares or debentures. This has had a prejudical effect upon the Limited Partnership Act, as by registering a business as a private company the partners then all have liability limited. A public limited company must consist of at least seven members. To come into being a Memorandum of Association must be registered which defines the nature and scope of its business. This memorandum must state (1) the name of the company—with the word "Limited" attached (2) the country where the registered office is situated; (3) the objects of the company; (4) that the liability of the members is limited; (5) the amount of share capital and the division thereof into shares of a fixed amount. This memorandum must be signed by the subscribers and it is provided that (1) no subscriber to the Memorandum may take less than one share; (2) that each subscriber writes opposite to his name the number of shares he takes.

With the Memorandum of Association may be lodged (1) the Articles of Association i.e., the rules and regulations for the management of the company; (2) a list of the directors with their written consent to act; (3) a contract by any director to pay for his qualifying shares and (4) a statutory declaration by the secretary, a director or solicitor employed in the promotion, that all the requirement of registration

have been complied with.

PROSPECTS OF AN INSURANCE AGENTS

423 P.K.S., Jubbulpore—Writes, "Will you please discuss in the columns of your esteemed journal the prospects and requirements of an insurance agent"?

That the insurance business is expanding day by day and holds out great possibilities is common knowledge. The insurance companies transact a huge amount of business; and insurance agents have extracting the chances of earning fat dividends by distance agent in the compation of the compation insurance agent is both lucrative and able. The profits that successful men in make are quite decent and should attract youngmen more and more. But the case supposes zeal for work, able canvassis city and capable salesmanship. The sometimes seems tiresome and the firmonths are the most trying period in thistory of an insurance agent. Disapposite are met with more often than progressitines become heart breaking.

A prospective insurance agent slowly fore trying for an agency master the form it ties of the insurance business and showly it a point to acquire a fairly good know the general business of insurance, and what facilities this business offer to the prospective of the prospective o

pective customers.

On appointment the first duty of the associated be to study the prospectus and distribution papers and discuss them by till he is familiar with all its ins. and is thoroughly acquainted with its strong and the strong acquainted with its strong and the strong acquainted with its strong acquainted.

Acquaint yourself as thoroughly \ full history of the company and its work as possible. A knowledge of the affairs companies working in the same line . . . covetable as this enables the agent to on solid grounds when the names of A companies crop up. The aim of an age make a name by tactful ability and . . service. He should be in a position to vita why he is convinced that the methods at the of his company have advantages over the his rivals. On the forceful and control talk on this point depends the success of t agent not to a little extent. He she id aware of all the alloys in the local in san affairs and by dint of his knowledge . The institutions should be able to show it. policy and general conditions of our in high are in some respects not so good customer as that of the agent's company in other respects they are less advant profit

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then of any kind within the scope of Industry are invited. Enquiries or replies from our will be published free of charge in serial order. Questions are replied by post on receipt stamps for each question. Subscribers outside India are requested to send two Interplies Reply coupons for each question. In order to facilitate the work of Editor's Departicular to help prompt action the readers are requested to send enquiries in separate letters.

P.D.M., Shamby—I appreciate your You should devote more time and in flour mill, rice mill and oil mill. Prehend competition from other sugar inters may hamper your business, and stop manufacturing sugar for ent. But if this also does not suit you time sugar and stock it for selling the time of scarcity. Over and above you can.

S.V.S., Lucknow—For machines by you such as wood screw making, essories making etc. enquire of Alfred (India) Ltd., 13/3, Strand Road; khin & Co. Ltd., 1, Royal Exchange of P. E. Thomson & Co. Ltd., 9A, essert; all of Calcutta.

N.C.C., Coimbatore—For spinning write to Oriental Machinery Supplying 11d, P12, Mission Row Extension, and W. H. Brady & Co. Ltd., Church et. Fort, Bombay.

Market of India, 40, Tadwadi, Chira dombay. You have to prepare thin dombay. You have to prepare thin the sticks for agarbati from bamboos. We book on paint and distemper manufactor may enquire of Thacker Spink & Co. 11, 11d., 3, Esplanade East, Calcutta for the

RS.M., Shimoga-For water bags of Bengal Waterproof Works (1940) Theatre Road, Calcutta.

 d H.V., Bangalore—Process of manufacopher appeared in May 1950 issue of

1 K., Travancore—For hops write to Ca. 1 & Co., 37, Grant Street, Calcutta and Stores, 2, Bertram Street, Calcutta. M.G., New Delhi—You may take dure of hair pins and clips on a mand expand the business accordand. Shoe lace making may also on a small scale. You may also hanufacture with Rs. 5,000.

1. Ollur—For required pencil write 1. 1. 1. 1. Beleghata Main Road, Cal-1. C. Law & Co., 2. Cornwallis Street,

VS. Amroha—There is no arrangetying training on plastic industry the slice making. For machines you to of Francis Klein & Co., Lid., 1, thange Place and Alfred Herbert with, 13-3, Strand Road: both of Cal-

11. Howrah—An article on cottage in-

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Male y

507 B.D.D., Etawah --For press machine enquire of Alfred Herbert (India), Ltd., 13-3, Strand Road and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

508 S.I.Q., Madras - Process of manufacturing vinegar will be found in Home Industries published from this office, price Rs. 3/9/including postage,

509 R.U., Nigeria—You may deal in indigenous herbs and drugs also in manufactured goods such as sporting goods, textile jute manufactures, rubber goods, etc. But you will not be able to do business on commission basis-You have to buy the goods outright. Address of Indian goods manufacturers will be found in Industry Year Book and Directory published from this office, price £1-68h.

510 F.C.I., Rawalpindi Advertising tape may be had of Eagle Advertising Tape Factory, 51, Eaglewadi, Kurla, Bombay.

511 V.P.D.S., Masulipatam—Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, 11ide Road, Kidderpur, Calcutta.

512 P.C.G., Allahabad—You may start import and export business. This business may be started on a small scale and can be expanded as you like. As regards cloth and cycle business you may also import these articles from foreign countries when your business will fall under general import business. Scope of textile and cycl. business is limited while the scope of import business is unlimited. You may import from a smallest needle to an automobile or an aeroplane. So it is advisable for you to start import and export business.

513 J.P.J., Rikhikesh—If you go through April 1951 issue of Industry which deals with an exhaustive article on Indian Soil and Crops you will get all the informations your require.

511 E.I.G.C., Bombay—We have no book on carbon paper manufacture. Process of manufacturing carbon paper appeared in March 1951 issue of Industry. For machine enquire of Jessop & Co. Ltd., 93, Netaji Subhas Road, Calcutta.

515 U.C.C., Kanpur—Pin making machines may be had of Baird Machinery Co., Bridgeport, Connectieut, U.S.A. Process of gloy making will be found in April 1950 issue of Industry.

STANDARD CHEMICAL & PHARMACEUTICAL WORKS

Manufacturers of:
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1, Jahar Lall Dutt Lane, Calcutts.

4

of U. . Delhi—Radio parts may be had of U. . . Ltd., 170, Dharamtala Street; Philips Electrical Co. (India) Ltd., 2, Heysham Road; L. C. Saha Ltd., 20D, Lindsay Street and Nalini Radio & Electric Corporation, 5, Lindsay Street; all of Calcutta.

517 V.C.B.P., Jamnagar—For bandage making machines enquire of W. H. Brady & Co. Ltd., Mercantile Bidgs., Lall Bazar, Calcutta.

518 T.N.S., Bhimavaram—Bottles may be had of The Krishna Silicate & Glass Works Ltd., 17, Radha Bazar Street; Imperial Glass Works, 9, Ezra Street; Victoria Glass Works, 130, Mechuabazar St.; Oriental Glass Works, 58, Bahir Sura Road, and New Cherry Glass Works, 137-15, Narkeldanga Main Road; all of Calcutta. An exhaustive list of glass bottle manufacturers will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/including postage.

519 N.V.D., Madras Process of manufacturing benzoin appeared in February 1951 issue

of Industry.

520 B.P.W., Patiala—Groundnut oil is treated with 10 per cent of its weight of fuller's earth, which should be dehydrated by roasting prior to use. Mix thoroughly and then heat the mixture to 100°F and maintain the temperature constant for 15 minutes. Lastly filter the oil through filter press. Thus a clear oil is obtained but the odour of the oil is somewhat earthy. To remove this bad odour wash the oil with 1 per cent solution of brine containing on equal amount of dry sodium carbonate. You have to extract juice from bhringaraj. Shellae wax and bhringaraj may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

521 S.G., Lucknow—You may consult Talbot & Co., Tower House, Chowringher Square,

Calcutta.

522 R.A., Raipur-Envelop and cardboard box making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and John Dickinson & Co., 6, Clive Row, Calcutta.

523 H.T.S., Garobadha Hath -- Refer your query to the Secretary, Royal Calcutta Turf

Club, 11, Russel Street, Calcutta.

of Bengal Supply Co., 23-24, Strand Road, Calcutta; Modern Traders Ltd., 22, Canning Street and Keymer Bagshawe & Co., Ltd., 22, Strand Road; all of Calcutta.

526 S.N., Kalimpong—We have no book on beeswax bleaching. Process of beeswax bleaching appeared in March 1951 issue of Industry.

527 S.K.V., Lucknow- It is not possible to

recharge exhausted dry cells.

530 V.A.C., Madurai—For addresses of Belgium you may negotiate with Consul General

for Belgium, 24/1A, Alipore Road, Calcutia, may also negotiate with the Consulate $G_{\rm eff}$ for China, 30, Stephen Court, 18B, Park so Calcutta.

531 S.B., Juliundur City—We as aware of the full address of New Human

532 B.B.T., Agra—For steel wire of Balmer Lawrie & Co. Ltd., 21, Netaji h Road; Calcutta Steel and Wire Agriclive Row; Paul Brothers, 115, Netaji Road and Standard Metal Co., 77-1, Netaji Rd.; all of Calcutta.

534 C.A.C., Chelakara--Process of facturing denatured spirit will appear course.

535 S.I.C., Jaunpur—For ice cand; machine enquire of Refrigeration & Airtioning Industries Ltd., 34, Ezra Street; irrators (India) Ltd., 59C, Park Street & Ice & Refrigerators Ltd., 5, Royal Farlace; all of Calcutta. For thermoflask of the following firms: Dutt & Co. Old China Bazar Street and Bepin Beha. 495, Old China Bazar Street; both of Co.

537 R.K.G., Dhampur—Formulas et paint and glass ink will appear in due -

538 A.C.B., Palamau—Following is of soorki mills: Ananda Soorkey Mill ! Galiff Street; Behar Surkey Mill, 2. Lime of Calcutta Soorkey Mill, 22A, Canal West in Durgapore Surkey Mills, 73, Mahesh Durga and Kamala Soorkey Mill, 153, Galiff Street of Calcutta. Following is a list of rolling India. Rolling Mills Ltd., Stephen Balhousie Square, Calcutta; Eyre Smell Ltd., Hide Road, Kidderpur, Calcutta and Durga Rolling Mills, 197-1, G. T. Road, Sc. Howrah.

539 H.A.H.C., Jubbulpore—Powdered to balans are used in tanning leather. Probable hide may be utilised in making glue.

542 H.J.S., Bombay-Further part regarding new sulphuric acid plant a available. It is still in experimental st. . . . has not been put on commercial scale.

544 S.C., Marakankadawala - For fittings enquire of the following firm-Bose & Co., 184, Chandney Chowk and Hardware Stores, 155-156, Chandney both of Calcutta.

545 B.R.T., Bikaner--Your enquity od in March 1951 issue of Industry und Enquiry Columns so it cannot be repeat better put an advertisement in Classifigain pages of Industry.

546 M.K.K., Mangalore—Process of turing benzoin appeared in March 1951 Industry.

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517 R.L.K., Davangere-Process of manufacartificial slate appeared in April 1951

of Industry.

H.C.P., Patna-Process of manufactur-. at goods will be found in Manufacture clouds published from this office, price including postage. Process of manufac-. spaw cream will appear in due course,

I S.R.C., Bombay-The article sent by you a musuitable to be published in Industry Editorial Board.

: WAK., Bombay - Following is a list of cards manufacturers: S. A. Leonard . 13-1A, Govt. Place East, Calcutta; Playing Card & Carton Manufacturing shkar, Gwalior; Oswal Playing Card Sadar Bazar, Delhi and United Playi Co., 81, Chuckla Street, Bombay 3.

* PKM., Travancore--Process of manurose water will appear in due course. KSM, Lahore-We cannot help you in · the special kind of wax without seeing streets.

1 - B.P., Ganjam—Tannic acid and gallic . be had of Calcutta Chemical Co., Ltd., 14 M Lane: Banshidhar Dutt, 126, Khen-Street and Fuzlchussein & Bros., 41, or Street; all of Calcutta.

AP., Ganjani Perfumery raw mate-. be had of Paradise Perfumery House, . ola Street: Essence Supply Agency, 6, 🗽 Streef, Calcutta , B. C. Patel & Co., 143, street, Bombay; F. N. Sirkar, 37, Canstreet, Calcutta and Perfumery Ingredi-() 31. Mangaldas Road Market, Bombay.

AC,B., Jodhpur- Process of manufacsouthfalene balls and rubber baloons poor in due course.

15 PC, Neemuch For tea enquire of roug firms: Bharat Tea Estate Factory, ¹¹, Jalpaiguri; Bharnabari Tea Estate Hasimara, Jalpaiguri; Rhoni Tea Fectory, Kurseong, Darjeeling and Ica Estate, Tung, Darjeeling.

GRS., Goraya To fasten rubber to ose a cement by macerating virgin · · · · · as pure rubber as can be had, cut in 103. in just enough naphtha or galsoweever it. Let it stand in a very tightly coaled jar 14 days, or a sufficient time · dissolved, shaking the mixture daily.

PKN., Madras For sarees enquire m & Co., 61-5, New Market and L. H. 10. Ltd., 10, Park Street; both of

BBT, Agra -For transfer pictures enquire of the following firms: Muklarji & Sons. 14, Badur Bagan Street; R. G. Paul & Co., 110/2, Grey Street: Signograph Co., 208, Gopal Lal Thakur Road and Union Investors, 32B, Chandra Chatterjee Street; all of Calcutta.

570 M.S.B., Ludhiana-Process of manufacturing pencil will be found in Industry Prize Article Vol. 1, Price Rs. 2/- including postage.

571 T.S.L.H., Cachar—For selling pine-apples you may negotiate with the following fruit dealers; Dulichand Kisholal, 146, Cotton Street; Gokul Chand & Co., 18, Bal Mukunda Mukkar Road and Gopilal Tulsiram, 68, Cotton Street; all of Calcutta.

572 M.P.P.C., Bhilwara-For candle making machines and moulds enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; both of Calcutta.

573 E.C.F.I., Ambala Cantt,—There is no arrangement for giving practical training in ultramarine. A good formula of ultramarine blue appeared in September, 1950 issue of Industry.

575 P.N.D., Agartala-For nut and bolt making machine enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, and Francis Klein & Co. Ltd. 1, Royal Exchange Place; both of Calcutta. Particulars of the machine will be supplied by the machine suppliers.

Janınagar--For umbrella fitt-578 N.D., ings you may write to Containers (India) Ltd., 11-2, Old China Bazar Street: Gambhir Chand Rathi, 39, Armenian Street and Sohanlal Mohan-Ial Ltd., 5, Lucas Lane, all of Calcutta.

580 C.M.C., New Delhi-For making wire of copper you should use wire drawing machine which may be had of Kilburn & Co. Ltd., 4. Fairlie Place, Calcutta; Jessop & Co. Ltd., 93. Netaji Subhas Road, Calcutta and Mather & Platt Ltd., Bruce Street, Fort, Bombay. Protess of enamelling copper appeared in January 1950 issue of Industry.

581 S.B.M.I., Aligarh - You may communicate with the querist with the number and initials care of Industry when your letters will be redirected.

582 G.D.S.C., Kanauj--Process of manufacturing liquid and solid disinfectant appeared in April 1950 issue of Industry.

583 S.F., Gorakhpur -All the machines you require may be had of Kilburn & Co. Ltd., 4, Fairlie Place, Calcutta; Dr. Bose's Laboratories Ltd., 45, Amherst Street, Calcutta and Prabartak Commercial Corporation, 61, Bowbazar Street, Calcutta.

BEFORE ORDER FOR STEEL FURNITURE Please Consult:

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Manufacturers of : IRON-SAFES & STEEL CABINETS ETC.

58, CLIVE STREET, CALCUTTA 7.

AND





14.30 Mar. 12 2

584 R.S.S., Purnea-You may negotiate with the following glass works: Balsukh Glass Works, 7, Swallow Lane; Burma Glass Works, 9, Erra Street; Glass Products Ltd., 56, Beleschia Road; Hind Glass Works, 35, Chittaran-jan Avenue; Jayanti Glass Works Ltd., 8, Ezra Street and Victoria Glass Works, 130, Mechuabasar Street; all of Calcutta. Packing paper may be had of Bharat Paper Syndicate, 1-2, Jackson Lane and Bholanath Paper House Ltd., 32A, Brabourne Road; both of Calcutta. Following is a list of industrial and commercial journal: Indian Textile Journal, Surya Mahal, Military Square, Fort, Bombay; Commerce, Royal Insurance Bldg., Churchgate Street, Fort, Bombay; Arthik Bharat, 3, Commercial Bidg., 23, Netail Subhas Road; Arthik Jagat, 122, Bow Bazar Street; Calcutta Exchange Gazette, 5, Mission Row and Capital, 4, Lyons Range; last four of Calcutta.

587 S.A.N.K., Darbhanga-Process of manufacturing extra-strong peppermint lozenge will appear in due course.

588 A.P.J., Rohtak—For selling calcine you may negotiate with Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane and Indian Mineral Industries Ltd., 22A, Dum Dum Road, both of Calcutta.

595 D.R.N.S., Bangalore City-Betelnut shall be cut in small pieces then put in grinding machine for powdering.

597 S.I.B., Amraoti-We have no book on ushan grass cultivation. For agricultural book write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co. Ltd., 3, Old Court House Street, Calcutta.

608 T.S., Nandyal-Following is the process of manufacturing rose ofto on small scale: Procure rose petals of one colour and layout 1 inch thick, in a vessel. Cover them with a clean piece of rag moistened with sandal oil and folded 4 times. The cloth should be thoroughly wetted by rasping. Layout over the rag on other lot of petals. Then close up the mouth of the vessel and place in the sun for 15 days. Finally press out the otto. Store in a stoppered phial and place in the sun for a month to clarity. Jasmine otto may be prepared by this process.

608 R.B., Madras-Rubber stamp making implements may be had of Rubber Sceven & Co.,

156. Cornwallis Street, Calcutta.

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Phone:

B, B, 514 & 5758.

609 M.A.B., Jodhpur-For essence of enquire of Paradise Perfumery House, 7. tola Street, Process of manufacturing na lene balls will be found in Manufact. Disinfectants & Antiseptics published from office, Price Rs. 3-8- including postage, 1 of manufacturing rubber baloons will be in Manufacture of Rubber Goods publishe this office, price Rs. 3-8 including postage

610 H.S.A., Meerut—For razor enquithe following firms: Esmail Yar Mo Bros., 22, Cutlery Bazar, Bomay; Madan. Sadar Bazar, Meerut and Diamond Scisson Outside Kamboo Gate, Meerut City.

612 P.K.K.P., Quilon-Process of facturing candles appeared in April 195

of Industry.

613 A.D.H., Marak-We are not whether life belts are stuffed with Kar Semul Cotton. No life belts are made of i-

615 U.W.M., Pyu-Oil extracting a: trifugal sugar making machine may be Oriental Machinery Supplying Agency 1'12, Mission Row Extension, Calcutta.

614 S.S.P., Siwan-Thermometer hydrometer may be had of Adair Dutt Ltd., Stephen House, Dalhousie Square, Ca and India Scientific Stores, 14-2, Old Bazar Street, Calcutta.

619 B.S.P., Hoshiarpur—Process covering silver from waste film will .

in due course.

624 II.N.K. Delhi-Process of m turing all kinds of ink will be found in 1950 issue of Industry. You may also Manufacture of Ink published from this price Rs. 3-8 including postage.

625 S.D., Calcutta-Process of ma turing aluminium flouride will appear

course.

626 T.B.F., Indore -All kinds of you require may be had of Calcutta (". Co. Ltd., 10, Bonfield Lane, and Banshidha 126, Khengrapatty Street; both of Calcutt 627 K.S., Markapur Process of 1

lantern sildes will appear in due course 631 B.R.T., Ratan Nagar—Sanskiii valent of Coptis Teeta is mishamilita. In F it is known as golden thread root. It is in the Mishmi mountains of cast of Imported into Bengal. Dried root is " a medicine. It contains neither tannigallic acid but abounds in a compoun. yellow bitter principle berberine soluwater and in alcohol. It is febrifuge. tonic it increases appetite, restores dipower and removes flatulence and v obstructions. It is said to be useful in ja as well as in debility, convalescence after and other debilating diseases, atonic dy-1 and in mild forms of intermittent fevcatarrhal and rhematic conjunctivitis. this made into a paste with Rosavanti is 5 a collyrium for the eyes.

637 A.L.B., New Delhi—Santonin is as ship, kirmala, kirmari-owa, etc. It is variable plant found in the Western Hinfrom Kashmir to Kumaon. Wormseed m had of Indian Herb Store, 31, Mullick: and Barshidhar Dutt, 126, Khengrapatty Street: geth of Calcutta.

611 K.V.N., Jaysingpur—Process of mahas live Industries, published from this ere is ice Rs. 3-8- including postage.

215 D.G.P., Saugor-Following is a list factories: Western India Match Co. Nambazar, Near Calcutta; Calcutta dustrial Works, 14-22, Canal East Rd., Match Factory, 16, Dum Dum Road. rom, 24 Pargs.; Kankaria Match Factory. nkaria Tank, Ahmedabad and Amrit rtory, Kargi Road, Bilaspur.

> A.T.C., Sakchi-For graphite crushines enquire of Jessop & Co. Ltd., 93, subhas Road and Marshall Sons & Co. Netaji Subhas Road; both of Calcutta. no hook on minerals. You may hownire of Thacker Spink & Co. (1933) Isplanade East and W. Newman & Co. Old Court House Street; both of

M.S., Nazareth--Process of manufacoffee tablets will appear in due course. · · / making machine enquire of Small Hills Mfg. Co., 22, R. G. Kar Road; Machinery Supplying Agency Ltd., ion Row Extension and Prabartak . . . Corporation Ltd., 61. Bowbazar all of Calcutta.

C. I. Y.B.S., Kaimandu-For . Undi enquire of the following firms: el el mat Book Depot, 195-1, Harrison Rd., thrury, Barnagore and Srl Aurobindo andir, 15, College Square: all of Calcutta

' I I' V., Bombay-Process of manufacencon, nylon, etc. and crystal plastic a in due course.

MGS., Madras -- Soap making machinin and of Small Machineries Mfg. Co., Kar Road and Oriental Machinery · Agency Ltd., P12, Mission Row Exboth of Calcutta. Raw materials for oring may be had of Calcutta Mineral Co Ltd., 31, Jackson Lane, Calcutta.

1 P. C. C. Faridabad -- For -industrial one of the following firms: Thacker 🖖 (1933) Ltd., 3, Esplanade East; " an & Co. Ltd., 3 & 1, Old Court House 1 Standard Literature Co. Ltd., 13-1, House Street; all of Calcutta.

AR M.S., Karachi-For automobile parts enquire of the following firms: domobiles, Opera Tram Terminus, : Howrah Motor Co. Ltd., Mission non, Calculta and Tyoti Motor Stores, vo. 8994, Calcutta.

413-121-1411 EDWINDER BONDON BERTEN B

666 S.B.H., Indore—For pin, tag and envelope making machines write to Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta, The firm will supply you particulars regarding starting factories with their machines.

667 C.C.P., Surat—Tallow may be had of Indian Tallow Supply Co., 21, Tiretta Basar Street and Calcutta Tallow Supplying Co., 19, Tiretta Bazar St.; both of Calcutta. For perfumes enquire of F. N. Sirkar, 37, Canning St., Calcutta and Ghose Bros., 50, Ezra St., Calcutta.

669 K.V.S., Mangalore-Process of manufacturing insulating tape appeared in August 1950 issue of Industry.

670 M.C., Calcutta-We have no directory of printing presses. A list of printing press will be found in Industry Year Book and Directory which you have already got.

671 S.P.C., Bombay-Process of stencilling will appear in due course.

673 S.V.Z.C., Lucknow-Please write in English.

677 M.Y.K., Muzaffarnagar-For electro-plating chemicals enquire of Alfred Herbert (India) Ltd., 13-3, Strand Road and S. Mitra & Co., 30, Bentinck Street; both of Calcutta.

682 P.N.K., New Delhi-For waterproof enquire of the following firms: B. C. Nawn & Co., 7, Bow Bazar Street; Bengal Waterproof Works Ltd., 32, Theatre Road and Hari Ram & Co., 171, Harrison Road; all of Calcutta.

683 P.R., Calicut-Process of manufactur ing snow cream and brilliantine will appear in due course. For registering trade mark you may negotiate with Dutt & Co., 82, Harrison Road, Calcutta.

685 S.R.R., Shencottah-Process of manufacturing attar and essences will be found in Indian Perfumes, Essences and Hair Oils, published from this office, price Rs. 3/9/- including postage.

686 P.C.B., Hazaribagh Leather may be had of Anwar Leather Stores, P-15, Bentinck Street, Calcutta; Chinese Leather Syndicate Ltd., 2-1, Russell Street, Calcutta; A. V. Mohamed & Co., 247, Angappa Naick Street, Madras; Empire Leather Works, 1/35, Khaleel Mansions, Mint Road, Madras; Bombay Leather Stores. La Touche Road, Kanpur; Cawnpur Leather Industries, Meston Road, Kanpur and Jeewa Bhai Ismail, La Touche Road, Kanpur.

689 T.N.S., Kotah-It is not possible to start an oil mill with Rs. 100/- as capital. You may start biri manufacture with Rs. 100/-. Process of biri manufacture will be found in Indian Tobacco and Its Preparation published from this office, price Rs. 3/9/- including postage.

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· 691 A.P.J., Rohtak—Formulas of infants food, casein plastic etc., will appear in due course.

698 A.S.K., Rampur—You may consult books on glue manufacture and phosphorus manufacture which may be had of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

701 A.H.S., Madras—For books enquire of the following firms: W. & G. Foyle Ltd., 119-125, Charing Cross Road, London W. C. 2; Chapman & Hall Ltd., 37, Essex Street, Strand, London W. C. 2 and Sir Isaac Pitman & Sons, Ltd., 1, Amen Corner, London E. C.

702 P.C.C., Samastipur -- Flat rice (Cheeras) in not manufactured in a machine. Dhenky

is used for making flat rice.

703 A.A.C., Jamshedbur--For securing Central Drug Licence you have to apply to the Director, Central Drugs Laboratoy, Govt. of India, 110, Chittaranjan Avenue, Calculta, who will supply you a form and other particulars. You should fill up the form and send it to the Director.

704 T.E.W., Darbhanga—Sulphur dioxide and methyl chloride gases are not manufactur-

ed in India.

705 J.P.S.L., Kanpur -Recipes of medicines you require will appear in due course.

713 O.I.C., Berhampur No such chemical which imparts glaze on confectionery is available.

715 M.S., Broach—All the chemicals you require may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta. Dyes may be had of Fuzle Hussein & Bros., 44, Armenian Street and Champalai Agarwala. 45. Armenian Street; both of Calcutta.

717 R.S.G., Raiganj Isopropyl alcohol may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. Fliter press may be had of Subol Dutt & Sons Ltd., 13, Brabourne Road, Calcutta. You imay use any kind of otto for flavouring sindur.

718 C.S., Kharagpur To communicate with any querist write him with number and initial care of Industry when your letter will

be duly redirected.

719 B.M.S., Saharanpur—Following is a formula of brake oil: Castor oil, neutral 10 parts; alcohol 10 parts, Mix and use.

720 B.D.S., Patna Dies for buttons may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta,

721 H.S., Budaun -For rope making machines write to Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

725 U.S.A., Meerut City—Process of gilding will be found in Electroplating In Practice published from this office, price Rs. 3/9/- including postage. For tempering box enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

727 S.D.S., Tadpatri—Boil water

730 N.I.P.B., Kunnamkulam—To beeswax cut it in thin flakes and put sun for 4 or 5 hours when it will melt cly; strain through linen.

731 N.B.C., Howrah—No machinequired for manufacturing sugar candy, pans for boiling sugar and iron perforated bottoms are required. After the syrup it is poured in the pots are pieces of sugar candy are hung in the smeans of thread.

733 S.S., Calcutta—Process of turing pencil will be found in Indust Articles Vol. 1 published from this offers. 2/- including postage. Machines had of Oriental Machinery Supplying Ltd., P12, Mission Row Extension, C.

736 T.N.B., Kanpur—For shellae of the following firms: A. M. Aratho 11, Stephen House, Dalhousie Square; Bros. Ltd., 6, Lyons Range and T. Shellae Factory, Hathibari, Tollygunge. Calcutta. Moulding powder is not maded in India at present.

737 D.V.S.B., Ludhiana. The anodation of aluminium produces a surface which is totally unlike the metal in clean deposesses a rather remarkable a properties. When properly prepared it coloured with a variety of organic depigments to produce attractive (decided) to the colour decided process of anodic oxides aluminium will be found in June, 19 of Industry.

739 U.T.A., Allahabad Collapsible may be had of Metal Box Co. of India P. Hide Road, Kidderpur, Calcutta.

740 G.U., Madras Process of matering rubber baloons will appear in dual Process of manufacturing candles at tablets appeared in April 1950 issue of I

741 A.P.W., Delhi-For rubber making appliances write to Rubber S. Co., 156, Cornwallis Street; V. D. Arce Peary Das Lane and A. K. Bhar & C. Ponfield Lane; all of Calcutta. For machine write to R. B. Brett & Son, 30 Street, London E. C. 4 and Gordon Ltd., 75-79, Farringdon Street, London For paper write to T. B. Allman, 42, F. Street, Edinburgh 2 and Gray James 16, Pilpot Lane, London E. C. 3.

743 S.C., Kumbakonam -We have ceived sample for Sambar powder. For sambar powder you should advertise a papers.

744 C.M.H., Delhi—For tin chloquire of Bengal Chemical & Pharma Works Ltd., 94, Chittaranjan Avenue, C

746 M.J.M.S., Changanacherry - Frairium cap enquire of the following Aluminium Corporation of India Ltd., 2 Subhas Road; Aluminium Manufactur - Ltd., 4, Fairlie Place and Jeewanlal (1929) 31, Netaji Subhas Road; all of Calcutta.

DYNAMIC EQUIPMENT POLICY by George ferborgh. Published by McGrawhill Book Jompany, Inc., New York. Pages 290.

1 ... is a lamentable lack of readiness on of the Indian industrialists to rerenovate their factories to keep the modern standards of production 'v output. Their general attitude is to , want the old buildings and machineries possible and to scrap a machine only could no longer perfom the job, for was originally designed or when the the charges on the machines outrun at term profits these equipments were other of yielding. It is quite possible and the life time of the installed till going on, new types of equipatter fitted to do the jobs and more echave been introduced in the market of as rivals to their organisations and and contribute to the reduction of their of profit. In the presence of improved the man quality of their service may decline or on to available alternatives even when of deteriorate absolutely. Only on asion is the question asked whether a 1 versine can do the job better and more or only than an existing one; or whether and land layout involving, say, two new " ... instead of three installed, would do or, one economically still. It is thus time tastrialists become a bit more re-equip-La ' seled and study the advantages of a policy of re-equipment to place their inches on a thoroughly modern line.

A many that the challenger is the best of machine of the time, it will also white operating inferiority at a constant there its service period and secondly, coallengers will have the same adverse on at the present one. Because of these I is as no determinable relation between and defender that by itself can a present replacement. Still a start me with these standard assumptions in requipment policy and deducing rendgment of the analyst indicates.

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mak under review attempts to develop ment formula together with its hort cut from the above mentioned estimption and considers the various sociated with replacement of rented at replacement of ownership by lease. a interest charge for replacement, rateadditions, etc., subject is a difficult one. Replaceassis, is after all a complex operation, a careful study for industrial advance ALLESS. Simplification is possible with undard assumptions as to the future; cuts may be developed for the full · · · thal procedures. But notwithstanding the fact remains that a reliable job lar. . . to and effort. Rationalization of this Hers to most concerns an enormous log for the energy and expense involved.

The book is an attempt to restate the underlying theory of equipment policy with running criticism on the current practices, and explains with charts and evamples the considerations that are to be taken into account in deciding upon a particular policy of equipment from the stand point of the economy as a whole.

OBJECTIVES AND MINIMUM STAND-ARDS OF SOCIAL SECURITY, REPORT IV. Geneva. To be had of International Labour Organisation, New Delhi, Price Rs. 3/-.

With the end of the global war, the objectives of social security have been taking new shapes. There is a perceptible change in the outlook among almost all natious regarding the minimum standards of social security. It is desirable that international agreement is arrived at on the various questions arising on the various aspects of the subject. The nature of benefits to be conferred and the categories of beneficiaries under the schemes are also of primary importance. Moreover the financing and administration of the benefits are also points on which clarification is essential. Possibilities of achievements in highly developed countries as well as in the less developed countries also require careful consideration.

The protection of the population in contitigencies covered by social security is developing along two main lines, viz.; (1) protection of all residents irrespective of economic status and (2) protection of all gainfully occupied persons and their dependents. Other benefits coming within the scope of social security are medical benefits, cash benefits, family benefits, donation of cash benefits, condition for right to benefit, right of appeal, etc., etc.

Another question of policy that arises in this connection concerning the form of administrative organisation necessary for setting up any social security scheme is whether administration should be retained in the hands of the State or should be delegated to autonomous and semi-autonomous bodies.

Modern ideas about these subjects on all their aspects have been discussed in the book All those who are interested in studies on social welfare will find the book a most illuminating document.

ECONOMIC PLANNING by Seymour E Harris, Prof. of Economics, Harvard University Published by the World Press Ltd., 37, College Street, Calcutta 12. Pages 577, price Rs. 12/8/-

In the wake of the First Five Year Plan by Russia in 1928 followed by two others transforming the economic face of the country in a dramatic way, there has been a considerable stir about the efficacy of planned economy as instrument for combating the various eco nomic ills from which a country might b

*** suffering. The world-wide depression which started in 1929-30 accompanied by falling prices and rising unemployment under conditions restricting demand of commodity goods set many countries seriously thinking about economic programmes in contrast to planless society. The war just terminated with its attending devastations has again brought the question of economic planning to the front, and no country being now without its own problems of conservation and allocation of resources, reinstability, productivity, monetary unemployment, inflationary spiral, exchange difficulties and unbalanced international payment, the pace of economic planning has received considerable momentum at present. The result has been that to-day there is no country worth the name which is without some sort of planned economy. Planned society is the order of the day now. All the important countries are now thinking in terms of regulation of productive processes, controls over consumption of commodities and inland and foreign trade, determination of targets of production, balance of distribution between production of essentials and non-essentials and thus are heading life from feudalism via capitalism to socialist stage of life.

The book under review makes a comparative study of the economic plans evolved in fourteen big countries of the world, viz, the United States, the United Kingdom, India, Germany, Greece, Japan, Norway, the Netherlands, France, Poland, Czechoslovakia, Hungary, U. S. S. R., the Argentine and gives a distinctive idea of the shape that planning has taken in those countries under stress of economic conditions and political awakening. study is particularly useful in as much as it presents a vivid account of the progressive movements in those countries, and surveys the progress made so far there. Countries schem ing planned economy can substantially profit by the perusal of the plans and their successes and failures and learn from their hard-earned experiences. The book however does not confine itself merely on the narration of plans in various countries but also analyses in a scholarly way the reasons behind the growing interest in all aspects of planning and the types evolved in each country.

Planning is going ahead in India, and indeed there is plethora of it. It is therefore desirable that we shall have full knowledge of the plannings in other parts of the world and their objectives and manner of operation. The book will fill thus a real need of the country in this respect and deserve carefull reading.

NOTICES &

(Manufacturers sending specimens and tamples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

FOUNTAIN PEN INKS

We have received from Bhivanendra Products Ltd., Katpadi, S. K., 5 phials of fountain pen ink of different shades, such as red. blue black, violet, green, and violet writing ink, which are found to be good.

We have also received from Octagop g_{ep} cate, 14, Raja Rajballav Street, Calcinia phial of blue-back fountain pen its preparation is found to be satisfactory.

REPORT OF THE PATENT OFFICE.

We are glad to receive a copy Report of the Patent Office for the year which has just been published. The gives a brief survey of the trend of in during the period together with statisty; of various proceedings under the India: and Designs Act and also Rules and othinformation regarding the activities Patent Office.

BULLETINS OF GEOLOGICAL SURVING

We have received a copy of Bu the Geological Survey of India by J. 11 dealing with cement industry in India. letin contains statistics of production and imports of cement in India. It at with the types of Portland cement manin India, specifications, major applicacement in the construction of Dams, re-The bulletin contains a map showing t sition of suitable limestones in India for manufacture, and list of the cement : turing companies together with their i nual production. The bulletin is publiorder of the Government of India available at the office of the Man Publications, Delhi.

THE PUNJAB ON THE MARCH

We have received several copies above issued by The Public Relation. ment. Punjab. Each copy deals particular subject, such as Rehabit Grow More Food; Education and Published Industries and Civil Supplies; In Public Works Department; Welfare Common Man: Local Self Government. Jails and Campaign against Corruption Projects; Veterinary, Fisheries and i etc. These pamphicts are profusely ili. to attract attention.

TRADE ENQUIRIES

(To communicate with any party write him direct with name and address given hel meantioning Industry.)

376 I.O., Khatri, No. 25-2/8, Dan del Colombo 11, Ceylon—Wants to be put with the suppliers of velvet powder an tion gold ornaments.

641 P.G. Gomez & Co., Chilaw, Cala Want to be put in touch with suppl exporters of hemp fibre and hemp yand products of green manure called sunn he all-

P. O. Palasbari Ka 652 Umesh Paul, rup-Wants to be put in touch with the deal in birds.

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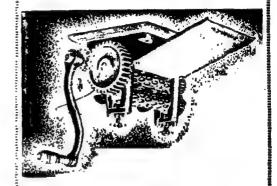
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The Electrician by V. L. N. Row, B.Sc., (Eng.), A.M.I.E.	Ħn.	6-0	Spoons and Forks — Penholders Collapsible Tubes, Fountain PenLeather Sult CaseBucket		
Apprentice Shop Practice by M. N. Swami	Ħa,	5-×	etc	Ra.	3 :
Sell What You Make—A Treatise on Marketing of Proprietary Atti- cles in India. By F. A Tyres Maseyk	Rs.	5-6	Utilisation of Common Products The Utilisation of Citrus Products = Citric Acid = Tartaric Acid = Papain — Starch — Glue—Casein — Essential Oils — Tincture		
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Free Lance by R. Dhara	Rn.	4-0	Cupts, M Sc Manufacture of Sytups & Cold Drinks	Ra. Ra.	3 (
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How To Do Business by N. M. Bancrjee	Rn.	4-0	Manufacture of luks	Ra.	9.6
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Wide World English Correspondence			Retail Trude	Ra.	9.0
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CALCUTTA, JULY, 1951.



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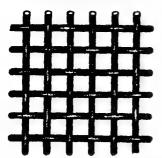
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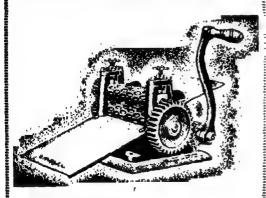
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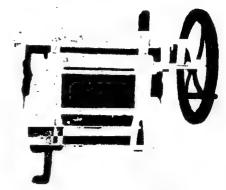
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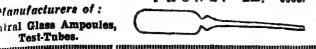
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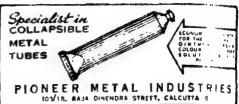
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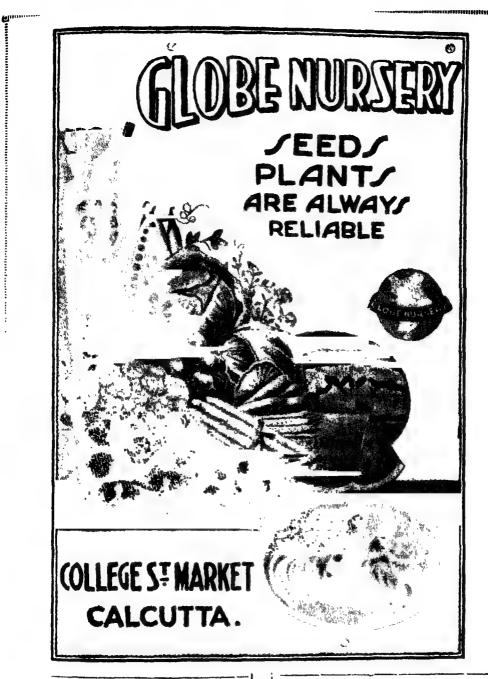
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SELECTED ROSE GRAFTS

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Cestrum Nocturnum (Hasnahena)	0	8	0
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Hibiscus Mutabilis (Sthal Padma)	0	8	
Hibiscus (Jaba):—			
Double-Red, Pink, Yellow, Blue,			
Orange	•	12	0
Jasminum Grandiflorum (Chameli)		8	0
" Arbonscens (Nabomullika)	0	12	0
" Jasmin	0	12	0
" Auricalatum (Jooee)	0	8	0
" Raye (Bela)	0	12	0
, Matia (Bela)	0	8	0
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Industry

FORTOR :

K N BANERJEE. _____

VOL. XLIL

CALCUTTA, JULY, 1951.

No. 496.

INDUSTRIAL PROBLEMS

If is really disappointing to those who wished to see India making good progress towards development of industries over the length and freadth of the country that India has not practically been able to report any satisfactory progress during the last three years of independence. There might have been some improvement in production in certain industries but over the longer segment of their industrial structure, production has remained more or less stagnant.

The major problems which the industries both medium-sized and small-scale are confronting to-day are as follows:—-

In India industries, as a matter of fact, have developed in a hep-sided manner without context to the industrial possibilities and needs of the country, as justified by the available raw resources, technical skill, etc. There is a grueiling absence of a spirit of co-ordination and co-operation among the industrialists.

The industries are feeling great hardship in raising funds for the sucper conduct of their business. The recent failures of small banks which extended them credit in the hour of their need have greatly undermined their position. There may be some extra money in the hands of some facoured people but unfortunately that money is not available for industrial use.

The cottage industries are living a precarious existence. Though there is an important school of thought in India that India must go the May Japan had gone towards the organisation of small industries it is the rettable that in India cottage industries stand disjointed and out of gear. The handicaps under which they are looking have greatly increased lately when the introduction of controlled economy.

There is no arrangement for long term financial needs of the country. The Industrial Finance Corporation which has been working for the last three years is not in a position to cope with full requirements it is called upon to fulfil. There is need for formation of capital organisations which will advance money to the people for the proper regional development of small scale industries.

(Continued on page 154)

-CURRENT TOPICS

DECENTRALIZATION OF SUGAR. INDUSTRY

A survey of the sugar industry was recently made to investigate if it was feasible to shift the sugar industry from U. P. and Bihar to other areas such as Bombay or Madras. The Government of India indicated their readiness to give financial assistance for such advantageous locations but it appears that in the opinion of the Committee this is not practicable. It appears that, save for one or two transactions, as yet there has not been any sizeable effort to shift sugar factories. There may, however, be according to this survey, some scope for shifting of a few uneconomic factories in U. P.'s eastern districts to more suitable sites in west U.P.

A survey of conditions in Madras shows that factories in that area have an even lower recovery rate than in U. P. and Bihar. Cane supplies are widely dispersed and transport to the factory tends to be expensive. The soil requires a large number of waterings and even with the comparatively high yield of cane per acre, fair price for cane in Madras has been computed at Re. 1/8/- per maund, which is higher than the fair price suggested for U. P. and Bihar. The price factor is often more important to the sugar factory than merely yield per acre. Bombay was more

favourably situated in the past because d the Deccan canal system and availabiling of land for large scale farms. Such lara farms may not now be feasible in view of the Government's land policy. Irrigation in Bombay is also difficult and tabewell do not appear to be practicable. Despite the high yield per acre, fair price for fame in Bombay was computed in 1949 by a expert committee at Re. 1/6/- per maun against the same price for Billion and Re. 1/7/- for U. P. Further, the Bombar Government have already declared that, a the interest of balance between foodgrain and sugarcane, they would not be able of supply more water to sugarcane factor farms. On the whole it would appear by the sugar industry in U. P. and Pale la a great future, provided adequate with tion is given to development of care as to making the industry efficient at a stages.

Government officials, technical expension others directly connected with the sugar industry participated in the survey.

DEVELOPMENT PLANS OF STATES

The development plans of the State which constitute an important part of a Planning Commission's report are a present in the final stage of considerate

(Continued from page 153)

Commercial policy followed by the Government is not based with an eye to internal requirements of the country but rather to her foreign exchange budget. The result has been that occasions are not rare when the essential raw materials for the industries are in short supply and that too in a most irregular way.

There is no sound organisation to co-ordinate the marketing size of the industries, to look to the production of articles, to control their quality and to introduce standardisation of goods. There is over and above no understanding between capital, labour and consumer. The spirit of swadeshi which moved the country a few years ago is also unfortunately absent.

It is therefore time that the Provincial and Central Governments and the public do think closely on these vital subjects affecting the progress of industries and general welfare of the State and make a co-ordinated plan that will put the industries on their legs.

y the Commission. Consideration of the state plans in the light of the available inancial resources of the country and to ntegrate them into common national plan of India has been taken up by he Commission since April 10 last and so far the plans of Assam, Bombay. Tyderabad. Madhya Bharat, Madhya Pradesh, Madras, Mysore, Orissa, Punjab. Rajasthan, Travancore-Cochin inion, Uttar Pradesh and West Bengal and the tribal areas of Assam have The plans of Bihar, nem discussed. James and Kashmir State and Saurashtra and of Part C. states remain to be ensidered and they will be finalised berth.

The development plans of the States are been classified by the Commission of the sty broad heads, viz. (1) agriculture of the last development; (2) major irrigation and power projects; (3) cottage and ther industries excluding those which one in the private sector; (4) transported ding roads; (5) social services adding education, housing labour and their welfare etc., and (6) rehabilitation to deplaced persons.

Agricultural schemes and irrigation ed power projects which have a direct earner on the food situation in the country ave been considered in great detail, keepig a view their possible additional centriution to food production. In regard to be new schemes of irrigation included in be state plans, the Commission has based that a number of irrigation and vor projects have been launched in afficial parts of the country without decrate investigation of assessment of some with the result that an avoidable tren has been caused on the available neal resources for development pro-C. It has proposed that a suitable beliancy should be set up for exercising delicessary scrutiny before new projects to a sumenced.

With the completion of the consideration the State plans the Commission to finalised one important aspect of work, namely, the programme in the ector including the Centre and the in the other two aspects of plannwhich will be dealt with in the report, think, (1) assessment of resources and commendations on questions of policy and (2) proposals for the private sector considerable progress has also been made. Detailed study of several industries with the representatives of the industries concerned has been made. These cover fertilizer, cement, cotton textiles, iron and steel, leather and leather goods, paper, glass, sugar, aluminium, agricultural implements and machinery. Rationalisation of the industry with its associated problem of rehabilitation of the retrenched personnel has also been considered.

The report is expected to be in two parts, one, dealing with the short term plans to be finalised by 1953-54 and the other a comprehensive Five-Year Plan ending 1955-56 which would cover a wide field involving questions of national policy. This would include recommendations for improvement in the public administration, machinery for the execution of plans at the Centre and the States, public co-operation, reorganisation of the system of agriculture, development of cottage and small scale industries, the future organisation of industry, conservation of mineral resources, development of irrigation and power, etc. etc.

LABOUR POLICY

The All-India Organization of Industrial Employers has urged review by the Planning Commission of the Government of India's labour policy, with particular reference to legislation. It was said that such a review was warranted not only in the interest of industry but also in the interests of the country and labour. It is stated that while some labour laws had been intended mainly to consolidate and improve the existing legislation, most others had extended the scope of legislation to field which should resmally be outside it. Legislation had been undertaken on such diverse matters as fixation of wages. settlement of disputes and the provision of social security to workers, etc.

The Organisation, therefore, felt that unless a thorough review of labour policy was made and it was adjusted to the general framework of the country's economy and the stage of economic development, the well-intended measures of labour legislation would have the unexpected yet the most natural result of putting a brake on India's economic

progress. On the psychological plane, the Organisation wanted the parties concerned to have an attitude of co-operation, as no useful purpose in its opinion, could be achieved unless both the parties realized their responsibilities more than their rights. It would be more in the interest of the country if the Government guided industry rather than directed it through **elab**orate legislative measures. The Communication further explained the difficulties the employers faced in implementing the Minimum Wages Act and the Employers State Insurance Act, and submitted that, while increased burdens were being placed on industry without regard to its capacity to bear them, the attitude of labour was not accommodating.

The Organisation therefore felt that if the provision of these facilities was enforced by legislation, those sections of the industry which were not much above the margin would have to close down. An aspect to be considered here was whether consumers could afford to pay the high prices resulting from enhanced labour cost.

AQUARIUM IN BOMBAY

India had great scope for the development of the fishery industry which is as important as the development of agriculture or dairy-farming to meet the requirement of food. The more so because India has an extensive sea-coast of about 4,000 miles and is endowed with numerous big rivers, lakes and legions of artificial tanks, big and small, all of which provide an excellent source of fish in these days of scarcity of food. It is for these reasons that the question of the establishment of an aquarium in Bombay had long engaged attention of many people during the past quarter of a century. It was long felt that such an institution would enable extensive and intensive research to be carried out in marine life which teemed in our waters and on which so many people were dependent for food. In fact, a marine biological station is a prime need in the training of all students who desire to have a true insight into the working of animal life. Some idea of the vast importance attached in Europe to marine biological work may be obtained from the large number of marine and resh water stations which dot its coast-line.

France alone has about 26 and at from those subsisting through Munic or Government support, there are s conducted by private bodies such as University of Montpellier. It is there heartening that an aquarium has h lately inaugurated in Bombay, It housed in a two-storeyed structure h at a distance of about 200 feet from sea-wall, and contains varied species inland and imported fishes. The bulk fishes have been specially imported for the Philippines, Java, Sumatra, Siare Malaya, etc. The preponderant number these exotic fishes come from Singan in Malaya. All these imported with have been acclimatised to our war where they have established therese and are being bred.

The laboratories in the aquir provide room for a dozen rosea workers. It has up-to-date facilities is as arrangements for the supply of their sea and fresh water, products to the proper aeration, gas, paraffin baths, optical instruments.

PAINT INDUSTRY

The crisis now facing the pr industry in this country, particularly regard to the procurement of essential materials from abroad, was referred to annual meeting of the Indian P. Manufacturers' Association. It wis . the Government failure of liberalize its import policy earlie delay by the Import Authorn . granting licences had resulted in industry losing substantial supplies 🕕 materials in foreign markets. Citis case of a particular ingredient used manufacture of paint it was said t as late as July and August last y in was available at between £. 40 and £ per ton, but the present price of the "? dient was well over £, 100 per ton. therefore to be desired that the Conment give greater assistance to int industries in their search for raw matter abroad, and that Indian Embassions Trade Commissioners in various contril be instructed to act as the court commercial agents abroad and to h industries not only by obtaining interf tion of the availability of raw materi

at also by introducing them to reliable arties overseas. The concensus of pinion was that a Central Marketing organization should eliminate cut-throat ompetition which has affected the quality of products offered for sale.

HE EFFECTS OF INFLATION

At present, there was perhaps no contrile problem of greater consequence o the country than what was generally referred to as inflation. The present nternational situation, leading to a re-arnament drive and the accumulation of nativials required for it, had resulted in in the wave of inflation. The position tas or which called for careful thinking nd heading. Dr. Mathai, the ex-finance diposit of India, reverted to this vital ubject in a speech recently delivered by nin, He said that of the various remoders proposed for inflation, one of the omnocreat and perhaps the most orthodox. vas increased taxation as a means of frament away surplus purchasing power. his remedy, however, was of doubtful prince of the present circumstances of nder Neither direct nor indirect taxation the levels they had already reached florded scope for further expansion. Net nerely would it cut into possible savings shield wight be employed in productive mestment, but in the case of large sections f the regulation, it would lower what was heady in alarmingly low standard of ivity. The extension of banking facilities in rural areas and the provision of further incentives for saving among agriculturists had possibilities which should be more fully explored. It was generally admitted that the final solution of the problem of inflation lay in increased production. The agricultural plans which were under consideration, were mainly concerned with bringing new lands under cultivation. In manufacturing industries production was slowing down partly for lack of materials but mainly because the plant and machinery, particularly during the war years, had been worked at a pressure which greatly intensified the wear and tear. It was impossible to replace worn-out plant and machinery to-day except at a cost several times higher than pre-war costs. He further added that better and more immediate results in the way of production would be secured if adequate facilities were provided immediately, for replacement of existing plant and machinery, rather than by setting up new units of production. It was further urged that the system of controls as obtaining now, did not provide a permanent solution for inflation but was only a means of temporarily suppressing some of its worst results. The inflationary potential remained just the same so long as the main factors underlying inflation were not removed. The result of the abolition of food control in December 1947 was a striking illustration of what would happen if controls were removed without a change in the basic factors of inflation.

NOTICE TO OUR READERS AND ADVERTISERS

An apology is due to our readers and advertisers for delay in any the current issue of Industry. It is caused by a long-drawn gas which cuts off completely our supply of gas for operating our supplying machines. We marked time for some days in expectation of a mation of the strike but as it still continues we had to resort to other angements for its issue.

We crave the indulgence of our readers and advertisers for this which is beyond our control.

-INDIAN SOILS & CROPS-II

THARACTERISTICS of the Indian soil

and the ways and means of their
nprovement for extensive and intensive
ultivation for crop production and suitbility of different soils for different
gricultural products were discussed in the
ust April issue.

The present article is devoted to uccinct description of the methods of ultivation of food and money crops. It regrettable that due to limited space at ur command it has not been possible to go to details about the modes of cultivation f all crops. We, therefore, confine our ttention in this article to the more nportant of the crops grown in the ountry for domestic consumption or xport.

RICE

DICE is the most important food crop. It is extensively cultivated in all the rarmer parts of the globe. It is essenially a crop of damp semi-tropical or ropical countries. It thrives under ery great diversity of climate and culture. t grows well in dry climates or at least ry in comparison with Burmah, Bengal, nd the Konkan districts of the Bombay residency. The finest varieties and the argest yields per acre are produced in istricts where there is a moderate degree f sunshine and a damp, warm atmosphere.

India has a very extensive area, on an verage, considerably exceeding 70 million cres annually.

There are three different classes of rice r paddy in Bengal, viz:—

- st ... Aus paddy, high land rice or summer crops,
- nd ... Aman paddy, transplanted rice, or autumn crops, and
- rd __ Boro paddy, very low land rice, or winter crop.

Each class is controlled by the water upply. On land that becomes dry in eptember, aus paddy is taken. The crop sown broadcast in May, or it may be ransplanted in June and will be ready for arvesting early in September. Each istrict has its own special varieties which re generally coarse grained. Finer

varieties of aus paddy grows extensively in Central Provinces but in Bengal it is not regarded so important as Amaz variety. When there is a plentiful supply of water on the land in October amaz paddy is taken. Seed is generally sown is seedbed in early June, the crop is transplanted out in the field in July, and the crop is harvested in December. Some times seed is sown broadcast in the fields but transplanting is the best method and gives the best outturn.

There are thousands of so-calle learn ties of this class of paddy, but most of the differences are due only to environment.

Boro paddy is not so important (secother two classes. Lands that flood from June or July to November are provided boro paddy when the flood suitable December. Seed is sown in the weekled in December, transplanted in January and the crop is ready for harvesting or months. In North Bihar boro paddy at taken in the beds of rivers and steam when the water subsides. Boro paddy a generally coarse grained.

From the above it will be seen the paddy can be grown all the year water according to the water supply.

PREPARATION OF THE LAND

Five or six ploughings and section three ladderings give the necessary we for sowing broadcast. For trained a paddy the land is ploughed 2 or 3 mest puddle (out of the 6 ploughings) at large dered twice until the field has the case ency of soft mud when transplant take place. Boro paddy is tre with a aman paddy.

SEED AND SELECTION THEREOF

Chocse the variety that is report according to the local demand and settle seed true to type is obtained. For its the sample is clean, free from and all weed seeds, not weevil-eaten, place and fresh. Old shrivelled seeds german delaw ly and produce weakly seedlings

SOWING TIME

This depends on whether the haddy aus, aman or boro. Aus is sown in

transplanted in June. Aman paddy should be sown in seedbed in the first of June. This date is very importing order that the seedlings may be planted by the middle of July. Every after the 15th of July acts against a mum outturn being obtained and they after the 15th July increases the assuring from drought or flood. But regal this date is not the limit of the decause its climatic condition is different from other places. Bore a may be sown and transplanted in the right, December and January accordes the supply of water and risk of

QUANTITY OF SEED

the duantity of seed rated by the fineness of the grain.

1 0 seers of a fine grained paddy and to seers of a coarse grained paddy milicient seed per acre. In transplantic seers of seed, either coarse or fine adjuddy, sown on 1/15th of an acre, are sufficient seedlings to transplant of land.

n transplanting it has been found that 0.1 seedling every 8 to 10 inches axes a better outturn than 2, 4 or 8 axes.

MANURES

the following manures are generally and in cultivating paddy: ...

- 1) 50 maunds of cowdung, or
- in 6 maunds of castor cake per acre, or
- 🖖 green manure with dhaincha.

the e may be employed by everybody to a should be learnt by heart by cultivator. Of course, there are monures, but the kinds and quantifield be tried carefully first before ying large quantities on large areas.

before ploughing in puddle. Dhainleft (6 seers per acre) should be sown of or May according to rain fall and ed under (green manured) at the buddling the land for translanting. the accumulation of water is too ed) surface damage too free manure be applied. But the manures are to be washed out during very heavy rainfall, and these must be compensated by the addition of oil-cake, cowdung or tankearth. Saltpetre is not employed as a manure in Bengal, though in regions of short rainfall, this manure is suitable for all kinds of paddy.

AFTER CULTIVATION

After cultivation with aman paddy consists simply of weeding once (generally) by means of the *Khurpi*.

With aus paddy one or two weedings are given. Sometimes the crop is partially ploughed. This loosens the soil and gives the paddy plant a better chance of spreading the roots and of tillering. Weeding is also thereby facilitated.

HARVESTING

The crop is harvested when the straw turns yellow or becomes dead ripe. Aus paddy should not be allowed to get too ripe. It sheds more brittle than aman straw, and it easily gets broken. This is another reason for cutting aus while it is still somewhat green. The corn is cut close to the ground and left in parallel lines in the field for about one week. Afterwards sheaves are made, and 100 to 150 sheaves stooked together, and soon after threshed in the threshing.

WINNOWING

At threshing time the larger part of the straw is removed and what is left is composed of grain, chaff, small bits of straw and dirt. Winnowing simply consists of allowing the mixture of grain and chaff to fall 5-6 feet on a windy day where the grain falls, and in falling, the chaff, being lighter, is blown away from the grain. In this manner the grain can be perfectly cleaned. The experience the cultivators have of cleaning their grain with the help of nature is really wonderful.

In Western countries threshing and winnowing are performed together by means of the steam thresher.

Threshing and winnowing machines are invented for cleaning grain, but in Bengal we are not yet convinced of its necessity for the small cultivator. It would mean capital expenditure which Indian cultivator requires for other things first. When our cultivators work on co-operative

threshing and winnowing may come introgue.

STORING

The methods of storing grain in vogue amongst the cultivators are also simple in the extreme, and yet, wonderful to relate. they keep the grain dry and sound.

Some make ropes of straw and make these ropes of straw into balls, 1 yard in diameter, with paddy in the inside. These balls are stored in their houses. The grain is kept in perfect condition in these balls.

Other cultivators build houses of straw or bamboos on stilts to keep them above the water level in times of flood and the grain is kept in excellent condition.

Other cultivators use earthen jarc. These are filled with grain and then covered up with a lid and the lid is made watertight and air-tight by means of cowdung plaster. If before closing the lid a piece of cotton were dipped in carbon bisulphide and placed inside the jar, these jars would be perfect so far as the storing of grain is concerned.

WHEAT

After rice, very nearly the largest area cropped in India is wheat. Its cultivation is prehistoric in the old world. It is grown best in the drier parts of the temperate zone, but its limits of growth are wide, and the varieties in cultivation are so numerous that some are adapted to grow in any country outside the Artic limits. In India approximately 30 million acres are cultivated with wheat, mostly in Northern Provinces and States. The young seedlings of the hardier varieties are not killed by frost, but frost or cold causes damage when the crop is approaching maturity.

VARIETIES

There are several species and many varieties of wheat, but it will suffice here to mention the Muzaffarnagar white, Buxar white and red deshi (U. P.) varieties. They are all good.

IRRIGATION

The dry and cold winter is favourable for the growth of wheat and that the moist warm places are unsuitable for growing this crop, with the exception of a few sandy tracts, the value of irrigation for wheat doubtful in Bengal, and the crop in a soils is usually raised without irrigation. The advantage in favour of irrigation, great in the U. P. and the Punjab. In former, the average yield of wheat in a irrigated area is 800 fbs. and in irrigate area 6280 fbs. per acre; and in the Punjab 576 fbs. in unirrigated area and 117 h in irrigated area. In Bombay the difference is still greater in favour of arrigate ted against 510 fbs. the yield of unirrigate area. The difference in the M. P. is about the same as in the case of the Penjab.

SOIL

Clay-loam, easy of irrigation studies in a dry locality, is the best soil to thous for wheat. Sandy loams are also utilize for growing wheat, especially dearth if me alluvial lands, where mixtures of when and barley or wheat and mustard or like seed are commonly taken. The hest cross of wheat are grown on lands newly brough under canal-irrigation. Where canal-water is used for irrigation for a number of year the outturn is found to fall off even below the original level. This is due (1) to be cessive use of water for irrigation which washes away valuable food-constituent at brings up to the soil undesirable solub salts, and (2) exhaustion caused by B taking of heavy crops at first without manure.

SELECTION OF SEED

Choose the variety that is desired a see that a clean plump sample of seed, in from foreign and weevil eaten given is tained, and make sure that the percentago f germination is satisfactory. At harm time mark, the strongest and healthing plants and place them at one size to give the requisite seed supply for the following year.

TIME OF SOWING

The time to sow the wheat crop is a October and November according to be supply of moisture in the soil.

QUANTITY OF SEED

The quantity of seed required is 50 th 60 seers per acre.

CULTIVATION

Shortly, the land is to be ploughed cross-ploughed, first with the countries

bugh or some improved plough and then itivated with the grubber, as often as evenient, and operations commenced as on after the rains are over as possible. hen by ploughing, cross-ploughing, grubng, harrowing, and rolling, land has been epared deeply and thoroughly (all the erations following close one upon anher, that there may be no undue loss of oisture), seed should be sown by drilling. least a fortnight's time must be allowfor the proper aerification of soil bevern the first ploughing and the sowing. polling or laddering is done after each eration there will be little loss of moisre 1 h fortnight's time soon after the onswers are over. Deep cultivation is visable for the wheat crop, hence grubng 🐦 ecommended. Sowing should be me that the cold weather properly sets ie, semewhat later than when barley d other rabi crops are sown. The middle November is ordinarily the best time for bwer Bangal. In rocky and laterite soils wing should be done earlier, say about e 20th or 25th October, or earlier still if e table cease early in October. About 10 ths, of seed are commonly used per re, but this is too much. 50 lbs. are lite crough. After sowing, the field ould be divided out into irrigation-beds v scrapara up little banks of earth with a poder shovel may very well be introduced to pratice in Bengal for making little right en-beds. If the soil is too dry, it hould be irrigated before sowing. Three four irrigations altogether are ample for M calibes; but one or two irrigations are mally required, though in moist tracts right curring be altogether dispensed with the aheat and barley crops. In such arts, begiver, wheat does not do well. here the natural climatic conditions in by where we exceptionally favourable, no regular may be required. One handhere is should be done within a week or h the first watering. Two have with the American wheel-hoe may terwards to promote the growth Beer of.

MANURING

about the manure is applied to the her crops in the rotation: If manures are plied they are spread before sowing the ed. The average outturn per acre is very

small in India, in comparison with England and the crops well respond to manuring. The following may be applied with economy:

(1) 80 maunds cowdung or

(2) 80 maunds pondrette (night soil). Applications of 1 maund of saltpetre have given excellent results in India. The quantity of saltpetre required is 11 maund per acre (top-dressed). If the land is found to be poor 1½ maund of bonemeal should be used beforehand at the time of ploughing, though no immediate benefit will be derived from such application. Five maunds of oil-cake may be used instead. But better immediate effect will be obtained from the saltpetre. The best manure to apply varies much, however, with the locality, and no general statements can be made. No manure is required for dearth land which is annually renovated with silt.

ROTATION

Juar or other millets and wheat are commonly grown in rotation, though both are grain-crops. Juar and barley being surface feeders may be grown together or successively with wheat which is a deeprooted crop. But better result would be obtained from Kulthi, or Bhadoi Mung, or Bhadoi Kalai being grown before wheat. Lentils or gram grown along with wheat is, the retically speaking, not a bad practice as the leguminous crop supports the wheaterop and prevents exhaustion of soil; but mixed crops with wheat are found to be undesirable for more than one reason.

AFTER CULTIVATION

After cultivation consists of 1 or 2 weedings with the khurpi and 1-3 irrigations according to the locality. In several districts irrigation is not necessary. If rain falls and the soil surface becomes caked run the bhida across the land 2 or 3 times to get the necessary mulch to retain the soil moisture.

HARVESTING

Wheat harvest should be commenced after the grains are quite ripe and the straw quite dry and crisp.

Now to obtain a successful outturn the points should be observed.

(1) The seed should be of the best variety suited to the locality in which it is grown; (2) a rust-resisting variety should be chosen; (3) the soil should be deeply cultivated, as deeper cultivation is required for wheat than for rice, barley, and oats; (4) saltpetre should be used for top-dressing; (5) it should not be sown mixed with other crops, and the seed used should be unmixed and select, and the threshing should be as clean as possible; (6) sowing should not be done until the cold weather fairly sets in, barley and oats being sown earlier in the season; (7) if there is not sufficient moisture at the time, land should be irrigated and bakhared afterwards before sowing; (8) wheat should be twice irrigated, if possible, in wheat districts proper, and the sites chosen for wheat land should therefore be close to water; (9) harvesting should be done after the grain is thoroughly ripe; (10) grain should be stored so that there may be complete protection against weevils. Paddy and oats are not so subject to the attack of weevils as wheat. and cultivators often find their wheat seed completely destroyed by weevils at sowing time, and their sowing of wheat seed results always in more or less partial germination; (11) Wheat seed should be sown after picking, to avoid smut, insect-pests, and damage by birds.

The subject of storing of grains against weevils and pickling will be discussed in the part devoted to Insect and Fungus Pests.

BARLEY

Barley is grown to a small extent all over India and chiefly in the Uttar Pradesh either by itself, or mixed with wheat, or gram, or with peas, or lentils.

CULTIVATION

Barley is grown to a small extent all over India and chiefly in the Uttar Pradesh either by itself, or mixed with wheat, or gram, or with peas, or lentils. The most favourite mixture is barley and gram. Barley and wheat as a mixture is not so popular, but barley as surface feeder and wheat as a mixture is not so popular, but barley as surface feeder and wheat as a sub-soil feeder may be grown together in rich soils. Rape (Brassica campestris), mustard (Brassica vuncea), taramani or tiramira (Eruca sativa), and linseed are

also grown along with barley. Lighten is preferred for barley than for w The land is prepared, and the seed so little earlier in the season than wheat less they are sown together. About Ths. of seed are used per acre. A more seed is required for barley that wheat, but 100 fbs. per acre is too li an allowance. Seed properly stored protected against weevils germinates perly and smaller quantitites of such are sufficient; 60 to 70 lbs, of barbay sh be ample to sow an acre. Barley is a dier crop than wheat and it does not rea the same amount of weeding and hirigal and it is not so subject to rust. It to also grown more successfully in diffe climates than wheat, which does not do well in warm and moist regions as ha does. One hoeing with the Amer (Planet Jr.) wheel-hoe and one range with 1 maund of saltpetre per acre mai applied with great advantage when plants are above six inches high. In Ret no irrigation is practised for banky. harvesting should be done earlier t wheat, i.e., before the grains are very: The cut sheaves may be made to standy ears upwards, near the threshing their when the grains are quite dry they can threshed or failed out.

MAIZE OR INDIAN CORN

The maize or Indian corn is one the most valuable cereals and is call vated at present in all parts of a world. In remote antiquity however it world. In remote antiquity however it worlds have the provided but exclusion grown by the Peruvians and Mexicus has, however, been found suitable for dian soil and is now grown successfully the cold hills of Sikkim and Bhut er, as as in the hot and arid soil of Martanum a Singhbhum. It does well in the most climate of Bengal and in the dry climate Uttar Pradesh, Rajputana, and the Purp forming a principal article of dict and the poor.

Maize plant is a tall, annual grace reaching a height of 6 to 8 feet, real has solid stem which, when young contains large amount of sugar. The leaves a large, with a wavy margin, and vary colour according to the variety of mainer than the flowers are of two kinds, viz., the mainer than the solution of the stalk, and the solution of the so

le flowers, protected by the bases of leaves forming a "Cob" with a silky plume of stigmas hanging at end. The female flowers are nated by the wind, which scatters leave, dry pollen on to the thread-like nas. The cob varies in length from 14 inches, and contains 8 to 24 rows soly packed grains.

CLASSIFICATION

A already indicated originally maize from America to India. There how regular Indian types but the hird three varieties are generally grisult:—

1 Large-cobbed dry grain variety groducing yellow grains.

2 the class that produces sweet and targe green cobs, usually white, for roasting or boiling purposes.

Real Class that gives the best popped Corn" (khai).

White, yellow, red and black varieties also distinguished, and then there is further distinction between kharif and maize, also between those which take also it 3 months growing and those hake as many as six.

CORN FLOUR

Maire grain, both green and dry, ed and uncooked, is somewhat difficult gest. But made into meal and cooked, easily digested. Corn-flour is manusred by first steeping the maize in hot r and then grinding it between large stokes. The pulp is then passed in sleves into huge vats where the flow settles, the gluten remaining in sleves.

MANURING AND ROTATION

Missis an exhausting crop and it has easy manuring or very good soil that a better yield. Carrots are soil sown in Uttar Pradesh between the of rabi maize, while the standing, especially when the standing, especially when the given to cattle and the roots are by people. In years of heavy raingle, poppy, mustard or safflower without. But wheat or barley is often that maize, though it is against the title of rotation of crops to do so. In

some parts of the Punjab three crops are taken in succession in the same year from the same land. Melon is grown after wheat or barley is off the ground in March and land is prepared early in July for the maize crop as by then the melon crop is over.

SOIL

As the maize prefers deep, rich, warm, and well-watered soil for its successful growth the nature of the soil is an important factor to be considered first. The hilly regions of the Darjeeling district are especially suited for growing high class maizes. In Lohardaga, Singhbhum, Manbhum, and in Bihar districts also, large crops of maize are cultivated. The damp alluvial lowlands of Bengal are not so suited for this crop, if it is intended for grain. But homesteads, throughout Bengal, where no waterlogging takes place, are well adapted for growing maize for green cobs.

CULTIVATION

The usual season for sowing the seed is about the beginning of the rains, even in the hills. After a good shower of rain. the land already ploughed up once in the winter menths should be ploughed and harrowed. The ground being thus prepared and manured, drills may be made 3 feet apart the seed of the best variety sown about 2 to 3 inches deep and about 6 inches apart, the seedlings being afterwards thinned out to distances about 12 inches; or 3 or 4 seeds may be sown together, in holes about 12 or 15 inches apart, afterwards thinning out the weaker plants when a few inches high. In rich soil wider spacing is necessary. About 3 or 4 seers of seed is thus required to sow an acre. When the plants have grown 12 to 2 ft. high one hand-weeding should be given. If the soil is found too dry 3 days after sowing and no rain is immediately expected, it is safe to irrigate the land once. Early sowing with irrigation, if necessary, gives much better result than late sowing when no irrigation is required owing to the monsoon being in full swing. Heavy rain does the greatest harm to maize plants when they are yet of small size. No harm is done to maize plants by heavy rains if the plants have in the meantime attained the height of 9 to 18 inches. If

integration is easy, it is better to sow the seed in April or May just after a good shower of rain, as the draught subsequent to a free germination is not so injurious to maize plants which are deeprooted plants, and irrigation may be resorted to if there is prolonged draught. After one hand-weeding, two hoeings would give the plants a very good start. The use of saltpetre would be of further benefit. If the land is known to be poor, cow-dung or some other general manure, applied in the cold weather or before sowing would give better results.

OUTPUT

It is more profitable to sell the green cobs and use the stalks for fodder wherever there is a demand for them than to let the grain ripen. The cobs can be picked and sold in June, and August. If they are allowed to mature, harvesting should be done in September, or when the grains are quite red ripe and dry. In Bihar sowing generally takes place in July and harvesting from October to December according to variety. Ordinarily 5 to 8 maunds of grain per acre is considered a fair yield, but 30 or 40 maunds are occasionally obtained.

JUTE

Jute is an annual plant that is cultivated for its fibre. It requires about the same soil and climate as rice, but it cannot stand water-logging. There are two species of jute, viz:

Corchorus Capsularis and Corchorus Olitorius.

Corchorus Capsularis has rounded capsules (fruits), Corchorus Olitorius has long pads (fruits). Of these two species, many so-called varieties are grown. Corchorus Capsularis appears generally green stemmed, while Corchorus Olitorius is either red-stemmed or greenstemmed. This appears to be the case throughout Bengal. A green-stemmed Capsularis or a red-stemmed Olitorius should be chosen as giving the best results. Jute requires plenty of moisture to grow well, but it cannot stand water-logging. It grows well on all soils, either highlying or low-lying, provided the requisite water is obtained.

PREPARATION OF THE LAND

The requisite tilth for sowing obtained by 7-8 ploughings and the ladderings. Manure is applied just before sowing the seeds.

SELECTION OF SEED

Good clean shiny seed of the variety required should be selected for sowing Strong healthy plants should be selected in the field for the production of the seed supply for the following year. Before sowing, the seed should be subjected to germinating test and 90 per cent, permination should be obtained.

TIME OF SOWING

The best time for sowing jute seed is immediately after the first shears at April and May, so that the plants may be strong enough to withstand the heavy rains of June and July.

QUANTITY OF SEED

In cultivating jute generally 11 sen of seed per acre is required provided the seed germinates at least 90 per cent.

CULTIVATION

The seed should be sown by drilling only nine inches apart, so that howing with wheel-hoe or bullock-hoe may be done after sowing when the plants are well up, and if possible, one hand-hoeing and one wheel hoeing or bullock-hoeing the two operations before the rains set in explaining when wheel or bullock-hoeing with hold wheel hoeing or the wheel or bullock-hoeing with hold what the rains have set in properly. Convain use the bidia after germination of long the soil and uproot extra plants.

MANURE

The following manurial applicate have proved economical in Bengal and the should be noted:—

- (1) Sixty eight and a half maunit of cowdung or
- (2) Seven maunds of cast. cake.

AFTER-CULTIVATION

The after-cultivation consists of the bidia-rings, one thinning, two weedings a

or two waterings (If necessary) ding to the degree of moisture of the the crop is then ready to be cut in siddle of August and the process of a commences.

HARVESTING

The jute plants are generally cut with the but in very low-lying lands simply ed. In either case the plants are a hundles and left on the field for two

STEEPING OR RETTING

the fibre is found on the outer layer of them and is mixed with gum and likely matter which must be removed the process of removing these is called by.

the bundles of jute are placed in a (pit) of gently running water and under water by means of bamboos or Some people plant bamboos aginst tream to prevent the bundles being ed away. Bacteria which live upon um contained in the hard rapidly free ane fibre and in 10 to 20 days after ing in water the process is complete. bundles now are taken out of the and the fibre is extracted by heating tens-with a stick and stripping off thre from the pitch which is left d. This process is called stripping. tibre is then cleaned by washing in water. This cleaned fibre is then g out and placed on bamboos in the ordry. When dry, the fibre is made boles and is ready for the market.

SUGGESTION FOR IMPROVEMENT

il c following directions have been an ended by experts for improving the f jute:—

Thin sowing; (2) Reservation of and portion of crop for seed which does allowed to mature fully; (3) using when pods have begun to form; fing preparation of soil; (5) Extra of seed with some district where soil and climate are somewhat

SUGARCANE

the sugarcane is a perennial grass thick solid jointed juicy stems reachtheight of 8 to 12 feet. The stem

is a cylinder and ending in a slender hollow top which bears the flowers. The roots are fibrous and wide spreading, either keeping near the surface of the soil or going deep down. In loose soil they stike straight down to a great depth. The larger fibres fix the plant, while the smaller ones which are very numerous are the feeding roots. Hence it will be understood at once that in order to obtain a good crop the soil should be prepared with extra care in order to give the roots the best possible chance. The sugar is contained in the stem. When young the stem is carefully protected by a sheath of rather coarse The sugarcane has so many enemies, not only insects always on the look-out for secret things, but even carnivorous animals have a weakness for the sweet juice, and jackals, wild pigs, and monkeys have to be guarded against. The joints are called nodes and the smooth portions between them are called internodes. Leaves which look like blades grow laterally and are alternate. The green cells of the plant prepare under the influence of the sun most of the sugar which when ready is stored in the stem.

VARIETIES

There are many varieties of sugarcane in India. Some are thick stemmed, others are thin stemmed; some are draught resisters, others can put up with lots of water; some are soft skinned, while others are hard; some are very long stemmed, while others are short. These names are as follows:—Malabari, vansi, bhuri, shojbhuri, songadi, kali, judi, deogadi, mahim yellow-green, green mauritius, bullu kaffu, red mauritius, etc.

PREPARATION OF LAND

The land must be ploughed, cross ploughed, and laddered till a fine tilth is obtained. This is obtained by 8-10 ploughings and 4-5 ladderings.

If the sets are planted on the plough furrow, this is all the preparation the land gets. If the ridge and furrow system of planting is adopted, the land is drawn up into furrows 2½" wide separated by ridges 2½" wide. These furrows are laid according to the level of the land, so that irrigation is easy. If the Poona bed system of planting is adopted, the land is laid out in beds 10 feet square with irrigating wide

parated by furrows 21" wide. If the auritius pit system is adopted when the cessary tilth is obtained the land is set it with pits (1 foot deep and 1 foot in ameter) three feet apart each way.

SELECTION OF SEEDS OR CUTTINGS

Choose the variety that is wanted and e that strong healthy sets are obtained. ich set should have at least 2 internodes 3 nodes and must contain buds. The ed is best selected at harvest time. Take e strongest and healthiest canes when eparing for the crushing mill and cut off e tops for planting purposes. These tops e of very little value for crushing and are cellent for seed.

TIME OF SOWING

The best time for sowing cane is when e cane is being harvested. Harvest the ne, and carry the canes to the crushing ills after, which the extra finen can best employed in planting the next year's op.

Accordingly December, January bruary and March are the months for anting cane. The earlier the cane is anted the better, in order that the cane ay be well established before the hot eather sets in.

QUANTITY OF SEED

The quantity of seed required per acre pends upon the method of planting. anting on the plough furrow requires an ormous number of sets in comparison the ridge and furrow system of plants. If whole canes are employed for unting, more sets will be required than only parts of the stem (sets) are used. the land is badly infested by white ants, tole canes should be planted. This gives and for the white ants, while the young bots are taking root, after which flooding a land keeps the white ants in check.

The number of sets planting in the righ furrow on an acre of land can sily be worked out. Each line is 9 inches art and sets are planted 1 foot apart in 9 line $(66' \times 132' = \frac{1}{2}$ th acre). In 9 ridge and furrow system of planting are are two rows in every 5 feet. In ort, planting on the plough furrow gions three times more seed is required in that of the ridge furrow system. In

this ridge and furrow system 17,160 $_{\mbox{\scriptsize Sets}}$ are required per acre.

PICKLING

As sugarcane is very much subject to the attack of insect and fungus pests it is important to sow the cuttings or spedil ings after pickling, i.e., after fungicides But as these substances even when the polym a dilute form are generally injurious to vegetable cells, it is best to dry the the substances with which the cuttires of seedlings are smeared immediately after wards with such manurial substances as have some effect in keeping out insectable. Thus half a pound of powdered sulphide of copper is mixed up with 100 lbs. of her water and if 8 ounces of powdered while arsenic with 1 lb. of lime are added to the vat containing the sulphate of capper solution, the sugarcane cuttings (1) 14 dipped in this insecticidal and funghidal mixture, immediately before planting, but the cuttings after being dipped in the liquid mixture should have a coating if powdered castor-cake (100 lbs.), ashea (2 lbs.) and soot (1 lb.), that the greath of the young plant may be helped by these manurial substances. If sulphate of copper is not available 1 lb. of alum may be used in place of 1 1b. of sulphate of copper for making the fungicidal solution. Half an ounce of asafoetida may be mixed with every 100 lbs. of the fungicidal solution, as the strong smell of asafoetida keeps out most insects. The mixture should be used up the same day that it is made. The quantities mentioned will suffice for tickle ing cuttings required for 1 acre of bade

ROTATION

Except in the case of a rate and variety, sugarcane should not be greatly in the same land more than once in I years. It is best to grow sugarcane after a preparatory crop of Dhaincha, sunn-heapper barbate (vigna catiang), cut down when in flower, in August. A crop of potato separate grown from October to February, and the land immediately afterwards get ready for planting sugarcane in February.

MANURING

Sugarcane responds were to a heavy outlay on manures. The following mixtures may be recommended:—

(1)	Bone-meal Castor-cake		10 30	maunds	per	acre	applied before sowing.
	Castor-canc		•	**	"	"	applied after sowing, in
(2)	Cowdung		600	99	79	91	two doses. ploughed in before
	Rone-meal		10		**	11	trenching.
(3)	Poudrette		350	**	.,		before sowing.
(1)	Powdered apatit	te	6			*,	before sowing.
, , ,	Castor-cake		20		"	11	applied before sowing.
				"	**	"	applied after sowing in two doses,
	Saltpetre		2	**	71	**	applied in two doses after the plants are a
(3)	Castor/ cake		35	n	"	79	foot high, but before June. applied in two doses before the two earth-
(6)	Fish manure		30				ings.
(7)	Salllower cake		30		21	**	after sowing,
1.6	Millioner care		00	17	,,	**	before and after sow.
(8)	Rape cake		50	**	11	11	ing. before and after sow- ing.
(9)	Superphosphate	of					
	lime		5	**	**	1,	A handful being put
	Sulphate of amn	10-				-	under each plant
	nia		11	.,	**	**	when about 1 ft.
	Sulphate of pota	sh	11	"	**		high.
	, and the process			**	**	11	· mgn.

AFTER-CULTIVATION

The after-cultivation of the sugarcane ops consists of:

- 7 Hoeings with kodali, March to June.
- Weedings, April, May and June.
- 1 Levelling with kodali in June and
- In finigations (1 in December, 1 in March, 2 in April, 3 in May, 1 in June and 2 in November).

HARVESTING

When there is little moisture in the hand when the top leaves have begun a time, the canes should be considered to cutting. The cultivator may also to the sweetness of the juice. If too the time is wanted in judging whether a may quite ready for cutting or not, cut nsively hot and dry weather may a during the progress of the harvest railous, and then the yield of juice will reduced. The canes are cut close to the standard. If stumps are allowed to be kept the ground, poor shoots will come out on yield a poor return next year.

TOBACCO

In treating of tobacco it is not sufficient to restrict oneself to the question of manuring, for so much depends upon the soil in producing tobaccos of different market values, and the price rests still move on the treatment of the leaf after the harvesting.

SOIL

A light soil or sandy loam, well drained, containing an average amount of organic matter and rich in mineral matters is considered to be best suited for tobacce cultivation. Grown on clay soils, the leaf becomes too coarse and inferior in quality, but clay soils usually give heavier yields. Sandy loams, rich in organic matter, produce a better sort of tobacco of the kind fit for making cigars.

Tobacco is sometimes grown after jute or maize has been harvested, but very often it forms the only crop of the year. Properly manured, it can be grown for 3 or 4 years successively on the same ground.

The soil of the seed-bed is dug up with a spade and manured with rotten cowdung and ashes and then raised about six inches. When the ground has been well pulverised and levelled, seed is drilled thin, so that the seedling may have about one inch of space around it. After sowing, the seed is lightly covered up with earth. The seedbed is kept covered with mats until germination takes place. Seed is generally sown in the first week of September or earlier in Bihar and Chota Nagpur. In dry laterite soil it is best to do the sowing early, i.e., about the second or third week of August. Half an ounce (1-1/6 tola) of seed is to be sown to produce plants required for one acre; but loss invariably occurs owing to patches of seedlings growing too thick. It is therefore advisable to grow seedlings from one ounce of seed for one acre of land.

PREPARATION OF SOIL

The soil for tobacco-planting should be prepared during the months of September and October. Eight to ten ploughings are necessary. Deep cultivation and thorough pulverisation of the soil are most important. The soil should be liberally manured with well-rotted cowdung and ashes. It is then to be levelled with a light harrow. It is needless to say that even poor soil can be made to produce a good crop by proper tillage and heavy manuring. Soils destitute of potash, unmanured soils, or soils manured with flesh, bones, calcium chloride, magnesium chloride, or potassium chloride, produce a bad burning tobacco which is unsuitable for making cigars. The use of cowdung also should be avoided in raising tobacco for the manufacture of cigars. Potassium carbonate, saltpetre, potassium sulphate, and calcium sulphate (gypsum) are the best manures for tobacco intended for cigars. They give to the leaves a sweet flavour and burning quality. Gypsum is excellent as a top-dressing and its use is particularly recommended to Indian cultivators. Crops manured with It suffer less from the effects of drought and require less irrigation.

TRANSPLATING

When the seedlings are about three inches high in the nursery, that is, after

they have shown three or four leave which takes place within six weeks from sowing time, they are fit for transplantation. The transplantation begins in the beginning of Aswin (the third week a September), and extends as late as the end of Kartik (middle of November). Early planting is preferable, especially for dry climates. The seedlings should be planted in the evening, three feet apart from our another.

AFTER-TREATMENT

A few days before the plants run to flower, their buds and lower leaves should be nipped off, and they should be so pruned that only eight leaves, and on to account more than ten, may be left to each plant from the top. Plants reserved for seeding should not be topped in this way but left to flower and seed. The plants always bring forth shoots by the side of the stalks of leaves pruned, and care should be taken to prune off the shoots every now and again until the leaves are conturn. The longer these buds and shoots are kept the more injury is done to the leaves required to be gathered.

HARVESTING

When the leaves feel thick and grammy and begin to turn yellow with brown spots they are considered mature and they should be cut off. Tobacco should not be cut over ripe. Harvesting of a plot should not be done at once: the mature plants are to be gathered first. The best time for ingreen ing is morning as soon as the demis of: plants. They should lie for some time in the sun, say for two hours, to make them sufficiently wilted, so that they can be handled without breaking. Care so all it taken not to let them become to much sun-burnt. It is better to cut where plants (close to the roots) than gather the leave singly. Harvesting should be delived for two or three days if there be heary rain fall, which washes away the gumnig matter of the leaves.

DRYING AND PERMENTING

Immediately after the plants are conveyed to the house, they should be house up on strings beneath the roof of a well-ventilated house, six inches apart. Consider the sheds are commonly used by the raises

this purpose, but this gives a bad to the tobacco. The plants should the hanging for more than two months, at they are quite dry. When very strong winds blow, the windows the res of the house should be closed. The occasionally sprinkled with the order to keep the air of the room by moist.

drying and fermenting the toces are cured. This may be caraccordance with the uses of the

COTTON

enitivated plants are so underwave been half so much confused onflicting opinions regarding the tims as the cottons. Practically Anical names in current use were · n cultivated plants, and these absequently, and in some cases that they are now mostly unre-. le. Instead of rejecting a nomenms hopelessly useless, one botaeter another has given his peculiar and re-assorted the published names. the duty of establishing species on Therms and grouping the cultivated rear as may be possible under Leabeen absolutely neglected and drug of the genus become confu-· confounded. Useless contro-Five engaged attention, such as or there are fifty or more species, or er, or even only one in the whole ther, whether a single charac tempreme value can be discovered, in a classification of the forms ased. The early authors dividtions into trees and bushes, or into and annuals. It has now been d beyond dispute that all species am under suitable environment als if left alone, and may in time were bushes or even small trees. when cultivated they readily renvironment, and when necessity me annuals or otherwise adapt . On dry stony soils they are etennials, on rich loamy soils anthe especially if restrained by cold tter months or by a heavy periowoonic) rainfall or by infestations

The general method of cultivation of cotton as given by Mallison is as follows:--

SOILS

The crop thrives best on fairly deep black soil, with a rainfall of 30 to 40 inches, and it is grown entirely as a dry crop. The most suitable soil is the so-called "black cotton soil" which may be found in some parts to a depth of five feet or more as in Ahmedabad, Broach and Surat; but cotton also succeeds on much shallower soils.

ROTATION

Generally the crop is grown alone, but where the rainfall is heavy and the soil retentive as in Broach, rice in the same or in separate rows is often subordinate to it. Coriander, sesamum, gram (Cicer arietinum) are sometimes sown to fill vacancies. The roji cotton of Kaira, etc. is, on sandy loam seils, always grown as a row crop with bajen (Pennisetum typhoideum) or pulses. The principal rotation crop with cotton is juar (Sorghum vulgare), but this may be modified according to district and seasco. Thus wheat is extensively grown as a dry rabi crop on the cotton soils of Ahmedabad, lang (Lathyrus sativus) and a mixed crop of tuver (Cajanus indicus) and sesamum as rabi crop in Broach, etc.

TILLAGE

Preparatory tilling begins usually in the bot weather by collecting and burning the stubble of the previous crop. Two cleaghings and two more harrowings may be required before the seed is sown, but the amount of preparatory tillage necessary depends on the previous - rop.

SEED

The seeds require social preparation for sowing, as they generally cling together, owing to the lint and fuzz which may still adhere to them. This is accomplished by mixing them with a thin plaster of cowdung, mud and water, and rubbing the plastered seed on the close network of an indigenous bedstead. The seeds can then be passed through the seed-bowls and tubes of an ordinary country seed-drill. If sown alone the seed is drilled in rows 22 to 26 inches apart. 'About 15 lbs.

per acre is the usual seed rate. Two harrows follow one drill to cover the seed and smooth the surface. If the seedlings are damaged before they produced true leaves, the crop should be resown, if the season has not too far advanced.

When the seedlings are about 4 inches high, the crop is ordinarily intercultured with the bullock hoe and hand-weeded. The weakings are then thinned out and the plants left about 18 inches to 2 feet apart, if in good condition, but if backward or stunted they are left closer together. The plough is finally passed between the rows in September or October.

CROP

Flowering begins in October-November, and may last till January if the rains are late and favourable. Picking usually commences in January and lasts till March or April. The crop is picked at short intervals, as the cultivators are afraid of their fields being robbed at night. The best time for picking is the morning, as the lint is then clean, owing to the dew on the foliage.

MODIFICATION ON ABOVE SYSTEM

In Surat the average rainfall is slightly heavier than in Broach, but the soil is not so deep nor so dense, and there is less risk of seedlings being destroyed by rain. The rotation crops are mostly kharif, whereas in Broach they are rabi. Juar is the principal rotation crop, always with a subordinate mixture of white tuber. Rice is never sown with cotton in Surat.

The principal variation in cultivation in the Karnatak is due to the monsoonsthe south-west between June and October, and the north-east between October and December. If sowing were to take place in June, as in other districts, the Dharwar crop would ripen in the middle of the north-east monsoon and the cotton be damaged by rain. To prevent this, sowing usually takes place in the latter part of August, and may be even extended to September. The seedlings are not thinned out to the same extent as in Broach and Surat, but are left comparatively close together.

In Khandesh two forms of cotton are grown, the one on black and the other on light soil; they generally occupy the same field once in three years. The light-soil

crop yields best with heavy rainfall, the black-soil crop with moderate rainfall. The seed rate is 10 to 12 lbs. per core at is sown, if possible, by June. Picking begins in October and is complete in the c

In selecting seed for next course should be taken to secure bolls i an a largest, healthiest and most commit fruiting plants. Seed should not be take from plants on which any of the interaffected by boll-worm. As a furt of the caution against boll-worm, cot: ; 44 should, before it is prepared for some grant steeped for five minutes in a $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{2}$ solution of copper sulphate and the dre in the sun. Disastrous effects 🕡 🤌 cotton crop may be produced by starting mospheric disturbances. The most tryconsequences are due to heavy ran to him quent changes of wind, cloudy wearner at frost.

POTATO

The great importance of the par as a human food in all the contra climates having temperate more fully appreciated than even bit's The role that this crop played in the la Great War especially in Germany and All tria, may never be fully realized cottake these two countries themselves. Natura ly, crop of such great economic in periods as the potato, and one having stolen the adaptation to the soil and climate and tions, involves many problems and la many enemies in the shape of ir sect at fungus pests with which to content

In this article it is our aim $f \in \operatorname{disc} W$ the basic principles underlying the polarises.

ROTATION

Potato is usually cultivated in Berga after jute, or maize, or Aus party of tracts of country where the potate is a principal crop, it often forms the only of the year. In parts of Bihar, in B plains of Northern India, and in Kresi his two crops of potatoes are taken from it same land in one year. There is a commit

tion in this country that potatoes do well ow on the same land year after year. le texture of the soil is no doubt renderfitter and fitter for the potato crops by e Critivation operations done for this op, but insect and fungus pests predonating prove the injuriousness of this ster, after a few years. It is best to www.nn-hemp, between June and August d of eigh the crop in August or Septemr. for green manuring adds consider-It is the growth of potatoes. Lime and d fresh ashes should be used if green anuling is done to hasten the decomposiin if the manure and prevent insect-42.4

VARIETIES

There are several varieties of potatoes and in different parts of India. The arm in different parts of India. The arm in individual with red skin gives a better addition the Nainital variety, and the pullinging of the Patnai potatoes would can heprovement. A Madras variety is served prolific, but it does not keep so all as the Patnai or the Deshi.

SOIL

The most suitable soil for the cultivam of potato is the sandy loam of a fine attice but not clay loam. Such soil, if centures a good deal of humus matter, bich makes it retentive of moisture, is streamed for the crop. Shallow, sandy stars soils and heavy clay soils, are not stable for potatoes. Sandy soils improvleby the admixture of pond or river silt swers very well.

FREPARATION OF THE SOIL

in the cultivation of potato deep had my and thorough pulverizing of the A second tial. Two ploughings and have gloughings with an improved e at allowed by one grubbing with a "nubber and one cross-grubbing 1 doi: done as soon as the rainy season the 3 series of operations being debated at intervals of one week between 10 contions. Then should follow one or to be owings for collecting weeds. rowing the land it should be resister seed bed level by means of lader. The land is next prepared for irrigain the fire sowing is done, as the making faction channels after sowing uproots humbar of seed-tubers. The field is first divided from its head, or main channel for irrigation, to its bottom, into a number of long strips 6 ft. wide, separated by water-channels about a foot wide, leading from the main channel at the head of the field to the bottom. The strip of land 6 ft. wide should then be divided into ridges and furrows 18 inches from one another. The ridges should be made in such a manner that they are at right angles to the main irrigation channel.

HOEING

Along these ridges 6 ft. long and 18 inches wide, potatoes should be planted in double rows 6 inches apart during September and October, 6 inches from one another and Linches deep. This is a tedious operation, one man makes a straight channel 4 to 5 inches deep with a narrow spade along each furrow and between two adjacent ridges. Another man then puts in two rows of pickled potatoes 6 inches apart both ways, and covers up the channel as he goes on, following the man who is making the channel, while a third man goes on putting manure along the covered channels only. Instead of spreading the manure all over the field this will be found a more economical way of using the mapuic.

MANURING

As potatoes are benefitted by high manufag, good manure may be used. One of the following manures is recommended for use:

I.

Bone meal . 6 mds. Castor cake (powdered) 18 m

The mixture is sufficient for manuring 1 acre of land. It may be applied immediately after planting.

II.

Rotten cowdung 100 mds.
Ashes or lime 15 ...
Castor cake 15 ...

In this preparation rotten cowdung must be applied before planting to ensure better yield. The remaining two substances are mixed together and applied after planting.

IRRIGATION

Whether the plants all come out within a fortnight or not, the first watering.

should take place within 10 days to a fortnight after planting, unless a good shower of rain makes this watering superfluous. The tardy sprouts will come up after the watering. If seed-potatoes are kept indoors under a heap of most straw or over damp sand for a week or ten days before planting, the sprouting will be quicker and more even after planting. Instead of flooding the field or running the water along the channels in which the seed potatoes are imbedded, it is best to run the water along channels between the rows of potatoes, or to distribute the water from the channel by means of an irrigation spoon. This prevents caking of the soil. But if the water run, along the channels in which the potatoes are imbedded hoeing should be done within a week after the irrigation to allow the sprouts to come up without resistance. The first earthing up should take place when the plants are 6 to 9 inches high. Then should follow two waterings at the interval of a fortnight and then the second earthing. If the soil looks dry, irrigation should take place before and after the two earthings at shorter intervals, say, once in 10 days. Three to six irrigations are necessary, according to the nature of the locality and of the season.

LIFTING

When the leaves and haulms are dried up completely and the land becomes quite dry, the potatoes are ready for lifting. Usually it takes three months to get matured potatoes for harvesting. This lifting is best done with the Hunter hoe unless a potato-digging plough is employed. Perhaps a slightly larger proportion of tubers gets cut when the hoe is used than when spades are used. 100 maunds to 150 maunds per acre is a fair outturn, though as much as 300 maunds per acre are sometimes obtained.

PRESERVATION OF SEEDS

It is difficult to preserve the seed of the superior and large sized hill potatoes in the plains, and one of the chief obstacles to the spread of the cultivation of the Nainital potatoes has been the high price that has to be paid for the imported seed at the time of sowing. If each cultivator could store his own Nainital potato-seed there would be no occasion to grow the Inferior Deshi varieties. The following plan as

given by N. G. Mukherjee in his "Handh on Agriculture" may be tried.

In a dark but well ventilated re erect shelves in which sand is to be sur and potatoes spread one deep shelves. Ten or twelve shelves arranged one above another on ٩ŧā All rotten potatoes must be weeded the seed-godown examined constant this purpose. Small sized potate better and those that come from surface of the ground, Only places are suitable for preserv seeds.

BRINJAL

Next to potato brinjal is ! highly prized vegetable. It is exgrown throughout India and other countries for its fruit which who and dressed in various ways, form palatable vegetable.

VARIETIES

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There are numerous varietie ent chiefly in shape, size, and colfruit. One variety has a scarles the same size and shape as the fi . . . large red tomato; another has a p egg shaped fruit, but these two seven dered more ornamental than usef at all the fruit of the latter is sometime with The varieties which are most estimated vegetables have dark or light $\mu = -4.1$ and are either quite round or enterthing in shape.

SOIL

High, well drained sandy garden soil rot too rich in organsuits this crop best. In claye, fruits become small though swe excess of organic, or nitrogenous present in the soil, gives rise to lopment of leaves at the expensi It is an experimental fact that plots give better result than plots with saltpetre and cowdung. 13 subject to diseases and attack of should not be grown in the san every year, and the land should be drained, as stagnant water giv fungoid diseases. The free use ashes at the time of sowing ... planting is also recommended and distribution and protected cultivation before identification

SELECTION OF SEED

The selection of good and matured hould be selected in order to get a rop. The seeds should be secured from a nursery or from seeds stored that previous crop. The latter method stest, of course. In the previous culting when the biggest first fruits are a golden yellow in colour they are a from the plants and cut right the first in this state they are kept in a treat two days. The seeds are then thected, washed clean in water and the sun and kept up for the next

SOWING

· preparation of soil is absolutely ... before sowing the seeds. The If pulverised with the kodali and and well rotted manure mixed e and ashes applied. This should • n January or February, while the exchanged be deferred till the end of we still later, the usual time of sow- cod in Lower Bengal being early Thorough watering of the soit take place before sowing is done. a shower of rain or watering of the winkling, seed is sown evenly and makly in a seed-bed, which should on m a cool and shady place. After the hand is lightly rubbed over the because the seed a covering. Every scent when there is rain, the seedcould have a light sprinkling of If the seed-bed is in shade wellfrom the sun, no other protecbe required, otherwise the hell in covered with palm or plantain grass thatch until the germinaplace in three or four days. securing should be continued every der germination also. If a heavy rain takes place the seed-bed carefully drained of standing insect pests appear, ashes and and be dusted on the plants.

September and October, the seed is September and October, the seed transplanted in October and Novice they bear from February to From May to August the ordinary dants may be made to bear fruits that show signs of decay by February

ruary or March are pruned, manured with mustard cake and ashes and watered. Fresh shoots will be thrown out, and fruits of a somewhat infector quality will be borne.

In Northern India, however, three sowings of this crop are usually made in the course of a year. The first is made towards the end of October, broadcast in beds, and the beds, and the young plants allowed to remain in the latter under a covering of grass thatch raised about 20 inches above the beds until the advent of mild spring weather. As soon as all danger from the occurrence of frosts, or about the middle of February, the young plants are transplanted.

The rest sowing is made in beds as before during the spring months, or any time between the middle of February and end of March, and the plants, when large enough to handle, are transplanted as before.

The third sowing is made early in the rains and given the same treatment as the others. This sowing begins bearing towards the close of the rains.

TRANSPLANTING

the field where seedlings are transplanted should be also prepared very early in the season. This should be done with a kodali or with an improved plough and grubber. The grubber should be passed afterwards once a month until planting. By the middle of May the land should be levelled and got ready for planting. Drains are made all round the field and a few water channels running through the field. Then furrows are made 36 inches apart and the voing seedlings planted along the middle of the fully after a heavy shower of rain. If placing is done in April or May transplanting the seedling may be done on the level plot 36 inches apart instead of in furr ws; and the water channels are made afterwards. Mustardcake and ashes and Fine should be applied finely powdered under each plant at the time of transplanting. Cowdung and castor-cake encourage the growth of vegetation at the expense of dowering and fruiting; and 6 mounds of mustard cake and 3 mounds of ashes and 1 maund of lime are a spfficient application for one acre. In a fortnight

or ten days the kodali should be passed between the rows of plants, thus levelling the field. Blanks should be filled up at this time. After another fortnight the kodali should be passed once more between the rows of plants covering the furrows into ridges. Irrigation may or may not be necessary according to the character of the season and the time of planting. If planting is done after a heavy shower of rains in June, irrigation will not be generally necessary till November; but if it is done in April or May, irrigation will be necessary at least once to save the crop from drought. From November to March irrigate once a month. The fruits will begin to bear in August; kuli begins to bear fruits from February to June; while the ordinary variety may be made to bear fruits from May to August. Thus brinjals are available throughout the year.

DISEASES OF THE PLANTS

Brinjal plants are liable to be attacked with the fungoid diseases, namely Dhashalaga and Tulshimara. These are due to the overlook of cultivators for not cutting off the tap-root at the time of transplanting and also to the roots getting cut at the time of earthing. These are fictitious causes. Root-cutting has something to do, no doubt, with the vigour of plants; and cutting of the roots when there is water-logging may indirectly cause spores of fungi to settle in the tissue of the plants. Waterlogging helps the spread of the bacillus. Every plant affected with a fungoid disease must be uprooted and burnt. The seed should be pickled, and the same locality always avoided for growing this crop from year to year.

PALWAL OR PATAL

This is a climbing or trailing perennial with annual stems, and is extensively cultivated in the warmer parts of India. Although found in a wild state in the Northern Provinces, the cultivated form is by no means a common plant in these districts. Like others of its tribe, it is grown for its fruit, which, when in an immature state, is much esteemed as an ingredient in vegetable curries. The fruit is about 4 inches long, pointed at both ends and swollen in the middle, when young, pale green, and when ripe, changing to a deep orange colour.

The seeds are usually sown in a lig well-drained soil in patches at 3 feet apai from May to the middle of July, and to stems allowed to trail over the group without support. It is also trailed trees, and grown in hedges where the stems can find support; but it is helieved to fruit more profusely when grown the ground. Like all rainy season crop it flourishes under the wet conditions whether then usually prevalent, but at a same time it dislikes stagnant mois street the roots. When selecting a spot for cultivation, a high well-drained positions should always be chosen.

When grown at low elevations $\eta \in$ hills, sow at the same time and given after-treatment as described for the plain

CAULIFLOWER

This popular vegetable is too we known to call for any description in the most esteemed of the varied for which have sprung from Brassica of the There are numerous varieties named seed lists, most of which readily as im tised in India. They change character to certain extent, but show little degenerate except when sown late in the season T warm forcing climate of this or attraction causes cauliflower to assume an earlier at quicker maturing habit than it possess when newly received from Europe, or other words, it is transformed from temperate to a semi-tropical plant. adh to be treated as such. If acclude seeds are sown in Northern India call the months of June, July and Aug. 11 15 plants produce most excellent hear are if seed from the selfsame stock - - " later on, or in September and October 1 plants shoot up into flower without firm ing heads, greatly to the annoyative at disappointment of the grower. If and the seeds are sown during the same it it is have been named for sowing acclased stock, the seeds often fail to ve "i" and when they do come up, the world." are very apt to die off owing to trache and excessive moisture then promise In order to have a long succession of s good plan to make use of both classes seed, i.e., acclimatised for early or a new sowing, and imported for late or aurun sowing.

As the young plants are rather more licate than is the case with other mbers of the Brassica family, the seed-ds require more careful preparation, and a seedings more after-attention than is aded by other members of that tribe.

The beds should be prepared before the ins login in an open, sunny situation, and all he about 5 feet by 5 feet for ary tunce of seed sown. For all early when they should be raised fully a foot the the surrounding surface in order to are read drainage, but for sowings made for the rains are over, they may be prered on the level ground. The soil and to friable and fairly rich, but not 241/2 a anured. We find old potting rin el some well decayed leaf-mould. ariant at a few inches deep over the surnot the beds, to be the best manure with m be given. After completing ise managements the seed should be an breadcast, and covered over with 3 h t light, finely-sifted soil. If the either is dry at the time, water immethis otter sowing with a fine-rosed sterms not, but if the rains are then in ega a withhold water except during the consider of a long dry break. The seeds sald ever be sown when the soil is in a turate 1 condition. It is, of course, mest unpossible to prepare a dry seedd during the rains, but if the beds are ised before the rains begin, as already non-needed, one day of bright subshine ill then try the soil just to the condition thould no in for the reception of seed.

Shade should be given to all sowings to be hours during the hottest part of order and withdrawn when the seedlings that is exceeded. Early sowings may, have a protected with advantage with the court material during the occurrence with a state of the plants an hour longer than the first terms are not being the gray, and in a generally unfit that is for transference to the open that it is not beautiful to the plants are not beautiful to the plants are not beautiful to the plants are not the open that it is not transference to the open to the plants.

he leavings, or those made in June to the first are all the better for being once are the defore being finally planted to be possible plants of these sowings should be feld be carefully taken up from the

seed-bed, and pricked out in new beds, made up as before, in lines 3 inches apart and 2 inches from plant to plant. If this plan is followed, the plants will be found to be much sturdier and hardier when the season for planting arrives, than if they had allowed to grow on in the seed-beds.

The ground for the illimate reception of the plants should be prepared in the same manner as recommended for cabbage, and plants put out in row 2½ feet apart and 2 feet from plant to plant. These distances will answer for all varieties excepting Veitch's Autumn Glant. This being a larger growing variety than any of the others, it requires the rows placed at 3 feet apart and 2½ feet from plant to plant. All after-cultivation is exactly the same as has been recommended for cabbage.

Cauliflower is subject to the attacks of several insect enemies. When in the seedbed, a small dark green caterpillar is sometimes very destructive to the young plants. When it is present, the leaves should be dusted over every second or third day with the ash of cowdung or gently sprayed with a weak solution of phenyle. If the latter is used, a teaspoonful of the fluid should be allowed to every gallon of water. After the plants have been put out in the ground. and up to the time that the heads are ready for cutting, few insects seem to trouble them, but if a few are grown on for seeding purposes, these often get attacked just before or soon after coming into flower by Aphis or green fly. Frequent syringings with a solution of phenyle, double the strength of that recommended for the plants when young, will soon exterminate this pest. After the plants have formed their seed pods they are sometimes troubled with a small greyish bug. This insect has a habit of dropping to the ground when disturbed; therefore, the best plan to get rid of it is to spread a cloth below the plants and gently shake them, then gather up and crush the insects that have fallen.

The treatment required at hill stations is similar as recommended for the plains. Imported seed only should, however, be used, as acclimatised stock seldom gives good results in the hills. The seeds should be sown in spring or in autumn in a warm sunny situation. When the weather is .

with matting or dry grass, but protected with matting or dry grass, but protection must not be overdone, or the plants will be weak and leggy when the season for planting arrives. In the lower elevations early autumn only should be made.

CABBAGE

Cabbage is one of the most popular of vegetables. There are innumerable varieties of four classes, Dwarf Early Whites, Dwarf Savoys, Large Late Drumheads and Red Pickling Cabbage.

The seeds should be sown broadcast in beds and covered over with about 1 inch of fine soil, from the middle of August to the end of October. The beds should be made in an open situation on moderately rich soil, and should possess a surface area of 25 square feet for every ounce of seed sown. If the soil is moist at sowing time, no water need be given until the plants appear, but if it is dry, water should be at once given from a fine rosed watering pot. and the supply repeated whenever necessary. Shade should be afforded for a few hours during the hottest part of the day immediately after sowing, and for a few days after the young plants appear, but care should be taken not to overshade, or the plants will be drawn up into a weak, leggy, and generally unfit condition for transference to their permanent quarters in the open ground. •

As early sowings are apt to be destroyed by heat and excessive moisture, only small chance sowings should be made in August and during the early part of September. The main sowings may be made after the middle of the last named month or during October. When the young plants are 4 or 5 inches high they should be planted out in ground prepared as follows:—

Overspread the surface to a depth of 4 or 5 inches with decomposed manure of the farm-yard class a month or six weeks before planting is required to be done, and dig over to a depth of 15 or 18 inches, thoroughly incorporating the manure with the soil during the operation. After the surface has been pulverised and levelled, lay the ground out in drills, 4 inches wide, 3 inches deep, and 18 inches apart, and insert the plants down one side of the drills at 18 inches as under. These distances are

sufficient for all classes of cable cepting the large growing Drag For the latter, allow 3 feet from drill, and 2 feet from plant i. Water immediately after plant repeat the supply about once a week the weather is dry. Weed when and occasionally stir the soil bet rows with a fork. When the pi rather more than half grown, ear: be drawn from the spaces betrows up to the base of the stemthis operation has been accomplaplants should appear as if planted 🕟 from 6 to 8 inches high. Atattention consists in keeping deweeds and flooding the furrowthe ridges once a week as before weather is dry.

Small heads of the Drumhead cabbage may be had in season in a cabbage may be season about the best becomber, and the young plants and in January at the distances as a cabbage for the Dwarf Early Whites.

The cabbage is not so liable attacks of insects in this country. Europe, but during some seasons of caterpillar appears. When it the only successful remedy for it is tion is hand picking until extern to the cabbage is not so liable.

The mode of cultivation request hills is the same as detailed for the For gardens situated below 5,000 for tude autumn sowings are recorded to the composition of the

When it is desired to have to use during the early summer the seeds should be sown is autumn, and the young plant from these to the open ground Spring sowings will not product ouse until late in summer, or early winter months. In order to have a continuous suppleshould be made at both season.

PEAS

Ted Jen

10

There is no vegetable of med seedman's list contains so many varieties are additionally seedman's list contains so many varieties are additionally seed and seed seed and

en several however, scarcely any nice exists but in name, and a select three, or at the most four, will be it may by any possibility be needed to addiant garden. Seed dealers are ytable to advise regarding useful tes.

SOIL

hough peas are grown on all wet are in the result of the second of the s

SEASON

he peas do not stand in long of rain they are usually planted is the end of the rainy season and entring of winter. In districts of clinches rainfall or under, there is notion to sowing them at the beginnthe rains.

PREPARATION OF THE SOIL

to land is usually ploughed twice the would-board or country ploughs. a did-board ploughs are used in great are in these parts. Ploughings are ther good rains or by irrigationing vol's or tanks. If the land is very striven after the harvest of paddy, it allol roughly at least on blocks of the or one-eighth of an acre. .. i.e opened with the Kodali Three or four such blocks an individual generally plants with peas, as otherwise it will is for him to properly attend to and irrigating the crop. Somethe furrows are opened with a shaigh. The furrows are made the deep and half foot wide into delengths of 10 to 15 feet at the in the harms the water channel. four to six feet is allowed in about in between them for Plants, hoeing and picking of " other operations. The growth of and he better and more vigorous which are prepared some time, through, before sowing than in lands in diamediately before sowing.

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PRECAUTION IN SOWING

Cool winds seem to favour the natural growth of the plant besides warding off the terrible diseases mildew—which attacks peas. With the object of aiding good circulation of the cool breeze usually coming from either west or east, peas are always sown in rows running east to west.

MANURING

A mixture of cattle manures and fresh earth at the rate of 5 to 10 cart-loads per acre respectively is then worked into the furrows. The application of fresh earth is sometimes dropped in which case the dose of cattle manure is increased by four or five carts, if not doubled. According to Firminger's Manual of Cardening manuring should be done by digging the soil to a depth of one foot and enriching with manure ai the rate of 10 fbs. farmyard manure and four ounces bone meal per square yard.

CULTIVATION

Seeds are dibbled by hand 2" to 3" deep and ½ to 4" apart in the furrow at the rate of twenty-five to thirty seers (Mysere) per acre, preterably in dry soil. This works cut at eighteen to thirty seeds for the length of a foot. Wrinkled seeds or unmature greenish coloured ones are rejected and only whitish coloured good seeds are selected for sowing. Seed meant for sowing purposes are generally dried well previous to sowing and sprinkled with lime outst.

Various insects, birds and other animals are found on the seeds and seedlings. To protect the seed it is recommended to shake it up in a vessel with sweet oil and then transfer the oily seeds to a vessel containing a little red lead where they are shaken to make the peisonous powder adhere to them. A boy should be set on guard over the pea plot till the plants are well above ground, say six inches tall. If there is no rain, water should be given once in eight days till flowering once in four days when the pods are forming and swelling, and gradually reduced thereafter.

AFTER-CULTIVATION

Germination takes place in 5 days after dibbling. After the plants have come

up they are hand watered for three to four weeks as follows:—

Once daily during the first week: 7 to 8 waterings.

Once in two days during the second week: 3 to 4 waterings.

Once in three days during the third and fourth weeks: 5 to 6 waterings.

When the plants are about 9 to 10 inches high, they are staked, usually with lantana stems which are got from the waste lands or hedges. Nearly five to six cartloads of lantana stems would be required to provide stakes for an acre of peas. These stakes are not as durable as bamboobranches used in some rare instances.

While staking, the crop is earthed up and the irrigation channels are deepened. Then follows irrigation of the crop from a well or a tank whichever may be the source of water supply. At the beginning olny light irrigations are given and if the rains fall in the meantime no irrigation is given at all for fear of water-logging. Later on, copious watering is given at each irrigation and the number of irrigations also, in case no rains are received, is increased. Sometimes two irrigations are given daily when the picking of pods has begun. Some thirty to thirty-five irrigations are found necessary for a summer crop.

HARVESTING

The plants flower in about 32 days and the first set pods are ready for picking in about 55 days after planting. Then there are about eight to ten more pickings at an interval of four to five days between one picking and the other. Usually the latter pickings are bigger than the first one and the last picking is equal to the first picking. The pods are cut off with scissors, usually hand-picked, by a batch of two coolies per row, going simultaneously on both sides of it.

For seed purposes, pods enough to give them the required quantity of seeds are not picked, allowed to ripen and dry on the plants. These dry pods are not picked separately but the entire plant is pulled off the ground. Both the plants and pods are further dried in the yard and thrashed with a stick when the seeds separated easily from the pods and are

gathered, cleaned by winnowing and state drying thoroughly for a $\operatorname{colp}_{[a]}$ days.

YIELD

1,500 to 2,500 fbs. of green p ds 70 to 100 fbs. of dry seeds are p ds outturn per acre. As in the case potato, one can never be sure of p ds good pea crop.

TOMATO

Tomato plant or lycopersicum use turn is a succulent annual, said to native of South America and the recultivated for its fruit which, when is much esteemed in salads, for ma sauces and for flavouring soups, the

CULTIVATION

In order to cultivate tomages selected seeds are scattered over the bed made up in the open situated the middle of July to the end of the For every bigha of land 2½ to a the seeds are generally required a scattering the seeds on the seeds light cover of leaf-mould should be put it as protection from rain and too a seed light.

The covering mats are to be the every evening if no rainfall is appoint at night and the cover put on a conor 9 A. M. otherwise the germinal disor even the seedlings will all be a tree Some sunlight is needed for see and else they will grow up into sich a pic During this short interval watgently sprinkled on the seedling and sion required, say, once in two days if the soil looks dry. When he pi grow a few inches high, they planted in the open ground in at 人心 good soil well soaked with · or In plan w moderately manured. frosts seldom or never occur, the plant may be planted in an open expenses tion, in rows 3 feet apart at between the plants, but in North of Ir where frosts are of annual occurs of the should be planted in a shelter as 150 and closer together. A good with planting for cold places, is to lace plants out in sets of 3 rows, and infinite feet between each row, 15 inch - betw each plant, and a space of 3 of 41 when frost is prevalent, or when the us are exceptionally cold, cover over ty evening with mats or grass tatties of hie weather becomes mild.

In cultivating tomato dung and urine horses and sheep can be used as man. American scientists have already section of that tomato requires for its man cach bigha of land about half a f superphosphate of lime and 25 mores of nitrate of potash should be to to the soil just before the land may to card for cultivation. Ashes of the cach cach be used as manure.

the tond erect by itself so it is better to ha piece of bamboo stick vertically the plant cannot grow vigorously to the plant is absolutely needed for much but instead the branches shoots to and there and partially lie on the modern conducing fruits of small size. The fixing each plant with a bamboo to the is hung a couple of feet above to the between two posts along each is he plants are loosely tied to the elements of jute ropes or by means through fibres.

In order to have a successful cultivan the cops of the branches of tomato
nto me to be cut off. If this is not
quity done the branches instead of
who mands, grow towards the ground
bush whereby the fruits of
dity will be produced and at the
difficult will be very difficult to gather
the All further attention is contecting when needed, and waterthe opening when needed, and waterthe opening growths must be cut
to allow a free circulation of
action prevent damping during wet

YIELD

Todoes grown from imported seeds to tariety, yield 40 to 50 maunds. But if sufficient manure is the soil the yield would increase to the first country generally varies and to 8 annas per seer. Taking on an

average the price of tomato as 2 annas per seer the value realised by selling 40 maunds is Rs. 200/-. Deducting Rs. 50/- towards the cost of supervision, water and manure etc., the net profit would be Rs. 150/- per bigha.

If two sowings are made, one in July and one in September or October, fruit may be had in seasor from October to July, provided of course the protection has been attended to during the colder months in cold countries.

At hill stations, sowings may be made during the spring months, and the plants when large enough to handle, planted out in well drained ground at the distances apart given for warm districts in the plains. The spet chosen for growth should be sheltered from winds but not shaded from the sun.

CHILLIES

Cultivation of chillies is carried on largely in the Southern Maratha Country, Khandesh and parts of Gularat : but the erop is grown in the kharif season. In the Kenkan, specially in the coastal parts of the Thana District, this crop is grown also in the cabi season under irrigation, and its produce is sold as green capsules. The reason why this crop does not thrive in the fair season in the Deccan or Gujarat, is that, there is then, excessive cold or heat which the crop cannot stand. The Konkan tract where both cold and heat are moderate is, therefore, specially suited for the cultivation of this crop in the fair season; besides when there is a great demand for green capsules, in Bombay and Surat, they are required to be imported from the Madras Presidency. The prevailing rates of green chillies are also high and hence there is a scope for the extension of chillies cultivation in the Konkan in the rabi season.

The following extract from Leaflet issued by the Department of Agriculture, Bombay would be of much help to the cultivators of the article.

VARIETY

The common variety grown is locally called "Shirvati" or 'Thakari." The, capsules of this variety are short, varying from 1" to 11" in length, and have a conical.

shape. In taste they are delicious and pungent.

SOIL

This crop is either grown on mal varkas lands or rice fields in the rabi season, the soil of which varies from loam to stiff clay. It is irrigated with well water and the area under this crop is over 600 acres in the Thana District.

TILLAGE

After the close of the monsoon the field or the plot where this crop is to be grown, should be watered and when the land becomes accessible it should be ploughed, preferably with a medium size ron plough. After removing the stubbles, the colds should be crushed and the plot should be ploughed again. The local practice is then to lay out the area into small beds with manual labour; but as planting in these beds does not allow the use of interculturing implements, considerible labour is required for weeding, earthng up, etc., and watering is also required o be given at short intervals. So, instead of these beds, the area should be laid out nto ridges and furrows, 3 feet apart with n iron-ridger or a cultivator or, in the bsence of any of these, with the Gujarat oe with a wooden plank attached between he blade and the head piece.

RAISING SEEDLINGS

The area selected for these should be igh lying preferably used in the last fair eason for growing rice seedlings. After ne removal of the rice seedling, the land hould be kept fallow in the rainy season Il September. In this month it should be loughed, weeded and prepared, for putting seed of chillies. It should then be laid it into beds each 8' by 4' Sixteen such eds produce seedlings sufficient for plantig one acre of chillies. Half pound of ed is required for sowing these beds. here being a residual effect upon the soil v burning, no manuring is necessary exept a light application of powdered cake · fish. If the area is not burnt previously, 1 cake at 1½ pounds per bed should be oplied. Immediately after sowing seed, it nould be lightly covered with finer earth nd watered and the beds covered over ith the leaves of palms, coconuts, straw, ass, etc. Next watering should be done

on the third day, and should be continued an interval of 3 to 5 days, depending up the nature of the soil. The covering grass or leaves, etc., should be remove after the seed has germinated.

TRANSPLANTING

In about 5 weeks the seedlings a ready for transplanting, being $5^{\prime\prime}$ to $6^{\prime\prime}$ height. It is always desirable to v of the beds on the day previous to planting. The planting should be 3 feet apart in h_0 directions and the distance should be $\frac{1}{2}$ form. The following method should adopted.

Along the side of each para of rich a line should be marked with a cos at on these lines marked at 3 for that should be made by passing a rope laid; 2 men standing on the boundary is the same moving along for this purpose. At the points small holes should be made with pointed stick and a handful of rotten far yard manure should be added to each them. The suitable time for planting; either evening or morning. The log practice is to take 4 to 5 seculors and plant them together; but by experience, is proved that it is not necessary to have. many planted together. Only two seed ings in one bunch are recommended. The whole area should be watered into edata after planting, and this watering bookly repeated on the third day. Subsequent watering should be done at an interval: 8-12 days in winter and 4 to 8 days a summer, depending upon the charafer? the soil.

ROTATION OR MIXTURE OF CROPS

There is no special practice of relative in the Konkan as in the up-ghat to the little rainy season rice is grown white and fair season such crops like chillies. The fair season such crops like chillies. The distributions, etc., are grown, selection depended upon the fancy of the cultivate. The would be advisable to have some the officer would be advisable to have some the officer in alternate years instead of chillies also year after year. This would minimize the damage caused by pest and diseases as we as introduce the benefits of rotation.

AFTER-TREATMENT OF THE UROP

The crop should be intercured for to five times. This also removes the week economically.

MANURING

In manuring castor cake should be used alone, or a mixture of castor cake, ulphate of ammonia and bone-superphosphate as given below:

Name of Manure. Cartor cake (alone)	Quantity per acre.		Time of Application
('astor cake	900	lbs.	1st About three weeks
castor cake	1,800	,,	after planting. 2nd Two months after
Unitarie of castor cake and sulphate of ammo- ma and bone-super- phosphate.			firs: application,
Sugarte of ammonia Prosuperphosphate	450 90 90	**	1st About three weeks after plating.
ester cake % Limite of ammonia % re-superphosphate	900 180 180	17	2nd fwo months after first application,

Path castor cake alone and the mixconsisting of castor cake, sulphate of ton a and bone-superphosphate as a roal above are found to be equally cons and the selection should be made a character to prices. Besides, when a vaid manure is available, it should spired at the rate of 20 cart loads per while preparing the land. When this an there is no necessity for the first of the cake manure.

More each manuring the crop should arthod up with an iron cultivator of a material roo with the interspace closed with act

HARVESTING

in the circking is obtained three months ting and the subsequent one at an and 13 to 4 weeks. The interval a successive pickings should not to exceed this period.

DISEASES AND PESTS

The common pest noticed is the malacian of the plant and the curling of the plant and the curling of the condition of the plant and the curling of the curling the curling of the curling of the cu

beneficial effect. Besides this pest, there is a fungoid disease of the wilttype which kills the plant. This disease is carried in the soil; hence in order to control this disease it is advisable to adopt a suitable rotation.

OUTTURN

The crop is invariably sold as green capsules and the outturn per acre is estimated at 11,200 lbs, valued at Rs. 700/-, at 16 lbs, per rupee.

GINGER

Although ginger is cultivated in all the tropical parts of the world still it is doubt-less a native of Southern Asia, where it has been cultivated and experted from the very beginning of civils aron. In India it is grown throughout the warmer parts but chiefly in the plains.

This plant belongs to a family of aromatic herbs with creeping root stock or rhizomes. Turmeric and cardamom also belong to the same family. The ginger plant is a perennial and can grow well in the shade; hence the adjoining land under large trees such as mangoes, etc. could be utilised with great advantage thus keeping out the insect-pests which would otherwise do much harm to the fruit plants.

SOIL AND ITS PREPARATION

Stiff clayey soil are not suitable for any root crops, but any soil which is not stony, gravity or gravelly will do for growng these crops. It also likes a deep, rich, ree working soil, which is naturally well lrained. It grows to great perfection on he deep, alluvial, sandy places like the oam of Baroda and Kaira.

When the plot selected for cultivation of ginger for the first time, it is desirable o plough up the land just after the rainy eason is over because at that time the and is in a fit state for ploughing. After doughing the laddering is done so as to reak up the lumps, thus making out most reparation during the cold weather for hese crops. In the following April after he first shower of rain another ploughing and laddering will render the land fit for lanting the bulbs of ginger.

MANURING

Manuring is scarcely done for this lantation but a maund of ashes and 2 or maunds of oil-cake per acre would benet the crop and the trees under which it is rown. If manuring is neglected, the trees nder whose shade these are grown would uffer injury due to repeated cultivation. he manuring should be done twice, just fter the bulbs are planted and before the oots are earthed.

PLANTING

After preparing the soil, the ginger ets which consists of pieces of the rhizome earing two or three buds are planted with he greatest regularity in rows at a depth f about 2 inches below the surface and span of 9 inches apart in each direction. Vith a narrow implement a number of quidistant little pits are carefully prouced. The sets are pressed down into these pits, covered with soil and the whole urface smoothed with the land

About two maunds of the ginger seed re required for planting an acre. When he plants have come up and before the dvent of rainy season earthing should be one along the natural inclination of the round to make passages for the heavy ownpour from the neighbourhood of the lant.

WEEDING

Weeding is thoroughly done by hand the crop may have to be gone over from three to six times according to the continuous of the field. The weeds should lifted up dexterously in each operation descend below the surface and the with an extensive system of rhistorical when it is impossible to eradicate and the damage the crop to a great extent.

IRRIGATION

The plant must be watered every sixt day until the rains. If thereafter there a break in the rainfall of more there is days' duration, irrigation must be in the When the rains cease, irrigation is required every sixth day until the crop is ripe. The crop is ready for harvesting by the conduction of the properties, by no certain rule can be given.

HARVESTING

When the leaves have completely withered, the root is dug out by hard with a small hand pick and is sold to a deal, who either sells it as ginger or extensit into sunth or dried ginger in which for it is used for condiments and medians.

STORING

The central room of any order of we built-house is usually cool and therefore the most suitable apartment for the toru A cool moist atm spher ginger. and ventilation are required. This is not should be sorted before it is stored and any decayed portions removed. The title ment is prepared by digging up the string floor 10" to 12" deep and by soa 14 th upturned earth with water. The conand the absorbed in eight or ten days floor becomes dry enough. The sorted ginger is then kept up in a in a in a in a height of 4 to 5 feet. The him when finished is covered with dry gine which are often sprinkled with dates The heaps are examined once in a $\sqrt{-k}$ and it found that the middle portion is wirmer than the rest the whole is removed from the room and any rotten pieces aratel In three or four days the ginger again heaped up. If the heap renal during the storage, it would be and the that the substance, is all right.

PREPARING DRIED GINGER

There are two known methods of ing ginger: (1) ordinary curing, (2) directime curing. The former is prod in all ginger-growing countries, the and is practised only in certain districts indis.

ORDINARY CURING

codinary curing is carried out with 11', whoped, properly matured rhizomes. , girger is sun-dried and the adhering th is removed as much as possible. tablistion in preparing dried ginger to salk the partially cleaned rhizomes vitte. This with rubbing cleans the and also softens them. e, is scraped off with a shell or don pieces of earthenware. appet ginger is now washed and exposed the or four days to the sun. The ger is thus bleached and dried. It is enthod by hand. The operation is a carefully, so that the shoots are not The ginger is again bleached in tollowed by rubbing as indicated After this the ginger is steeped value for about two or three hours and were' to the sun to dry. When dry it is hel on a coarse cloth, which removes the mining outer skin not removed by As a sperations,

MODIFICATIONS

Notice the control of this proincrease adopted at various places.

The parts of India the ginger is mater for as long as two days.

The state roots are placed in water for y they are uprooted for, should the le dried with the soil and roots have the it, the product will not be

in Gujarat is carried out either with a piece of earthenware without the rhizomes on a coir is detead. In Jamaica ginger peels defead and the fingers of the hand and the fingers of the other portions. In the parts of S. India no peeling is not all of the being well soaked the ginger that under foot in the washing tanks.

This considerably lowers the cost of production.

The peeled product should be immediately put into a tank of clean water and thoroughly washed with frequent changes of water. This has been found very necessary if a light-coloured dry product is to be obtained. On exposure to air the peeled rhizomes darken considerably in colour and this stain persists. Where ginger is being cuted, a good source of water supply should therefore be near at hand,

In order to obtain a white product peeled ginger, after washing, is soaked for some hours in lime water and then allowed to dry. The lime may then be washed off, if required. Liming improves the keeping quality of the ginger,

Drying is carried out in Jamaica on cement barbecues, and in certain places in India, on mats and going bags on the ground. The latter practice should be avoided if the ground is set or damp. In certain districts in India after the ginger is well dried, it is carefully rubbed by hand on a coarse gunny bag and then allowed to dry again. This is said to improve the white colour of the dry product.

SULPHUR CURING

in sulphur curing, the green ginger was treated as in the ordinary method but after peeling it was placed in a tank of lime of the consistency of whitewash for a period of about two hours, during which sime it was stirred once or twice. The garger was then put into wicker or coirbottomed baskets and placed on bamboo racks or shelves in a closed chamber and sulphured for 4 hours. It med-wall room 6 ft, by 6 ft, was used for this work. If had a door at one end as the hearth opening from the outside at the other hearth consists of an iton pan or tray supported on a semi-dicular wall about t ft. 6 ins. high. Sulphur was placed on the tray which was then heated from below. The quantity of sulphor used in the first instance was 7 lb. per 1500 lb. of green ginger. The next day the ginger was placed in the sun to dry and in the evening the liming and sulphuring process repeat. ed. 8 lbs. of sulphur were used this time and the period of sulphuring was increased. o 12 hrs. The process was repeated a hird time, the quantity of sulphur having seen increased to 9 lb. and the period of exposure shortened to six hours. The product was then left to dry on the barsecue and when well dried, the lime was washed off and the rhizomes put to dry again thoroughly.

The dry ginger so obtained is a comparatively plump, almost white-coloured and with a good fracture. It is much less usceptible to mould and insect attack than rdinary dried ginger. The disadvantage of the method, apart from the small extra ost and the trouble necessary, is that the product so cured is not saleable in all ountries owing to the sulphur dioxide it ontains.

It is recommended that only sound, ully-developed rhizomes should be used or drying. While the first year rhizomes are best for drying, second year rhizomes an also be used advantageously.

The great advantage of curing is that vhen there is no market for raw ginger wing to an over-supply, it would be a neans of preserving the crop for at least period of a year.

RADISH

This is an annual, a native of China, and is cultivated for its fleshy roots, which are generally eaten raw when in a young ondition. There are two principal varieties, the long-rooted, and the globular or urnip-rooted, and numerous sub-varieties of both.

An acclimatised, long white-rooted 'arlety is extensively grown in Northern ndia by the market gardeners, but it s not held in favour by the European, wing to its mildness and general want of lavour. It is usually sown in the rains, ometimes very early, as it is often met vith in the bazars by the middle of July. A second kind also exists with roots imilar to the one above described, but it s not grown for the root, although the atter can also be used, but for its long eed pods, which, when young and tender, ire eaten both raw and cooked in vegetable It is known to the European inder the name of rattailed radish Raphanus caudatus) and by the local inhabitant as seengra, probably so name from the word seeng or horn, owing to the horn-like appearance of the pods.

All the imported varieties leads acclimatise in Northern India, and show, degeneration even when grown over a br series of years from the same strain, un vided seed is always gathered from sour wellshaped roots, and then no plante, the common longrooted white kinds as allowed to flower near them. When it desired to save seed, the most shap was best developed roots of October south should be taken up when about the size. a tennis ball in the case of the congle kinds, and when rather thicker than 4 thumb in the case of the long-rooted som and transplanted in rich soil at 3 for the each way. Before planting them in them ever, the leafy tops should be cut all as also a portion of the fleshly root from the lower or root end. When ready for plan ing, the roots should only possess if carry ing crown, and about two-thirds it fleshy part below, and, when being plante should be inserted sufficiently deep with ground to allow of about 2 inches to cover the crowns. Shortly after that ing, new leaves will spring out, and name ous root fibres will be produced from a sides of the original fleshy to the second nourishment for the tall branch is the we ing shoot that will eventually to be a

The radish requires a A 1 123 manured soil and plenty of water to mean of sowing until large enough to well as As the roots only remain in a fit quality for the table for a short time, is while should be made at intervals of ten was: a fortnight when a constant supplies desired. The seeds, whether imported? acclimatised, may be sown at at a ... between the middle of August and id January, but when it is desired ! the common long-rooted countres is beginning may be made as soon as to the have fairly commenced. Sowii. made thinly broadcast in beds. lines at 6 inches apart, and in a mer ask thinning out to 3 or 4 inche Owing to the short time the roin the crisp tender condition the be in when seen upon the table, in the after cultivation is needed. A single weeding will usually suffice for each sowing.

At hill stations, sowing may be made March until the end of August, but the rains are in progress, some promohen should be given during the occurred heavy showers.

ONIONS

There are very few vegetables cultilin the dry parts of India with more section this wholesome onion. It has treed fortune to be generally appretion almost every househould. It has the flavour and digestibility of approximat articles of food that would approximat articles of food that would approximate the without its aid, while to the dids a zest that contributes ailke parament and health. Although there the difficulties to be encountered and difference between a well-grown and one under poor management.

The variety most generally grown titles the common pale-red onion of the. It is mostly depressed globular and but evidently little care has been to esecure uniformity. In colour it is tool outside and creamy-white, with less treaks inside. The skin is membered and fragile and the flesh very firm, and create is mild, and the bulbs keep. White skinned onions, which differ it on the pale-red sort, are grope in digarts of India especially in the Beneficool of Dhulia and Banaras.

TREATMENT OF SOIL

I'm nion can be grown on any kind the poor land must be assisted by d counting. For handsome bulbs the say crop a deep rich loam of a shed light texture is required, althe ethesive loam, or even a clay. to proved for the purpose; while soil excellent results may be had by good management. In any the oil must be well preparerd by driving, breaking the lumps, and layin readges to be disintegrated by the ber at if needful its texture should as far as possible, at the A coat of clay may be spread stree of sand, to be thoroughly inlated with it; on the other hand, that staple is clay, the addition of be advantageous. All such The measures yield an adequate in if prudently carried out, because it is possible to grow onions from year to year on the same ground. The plant is not fastidious, and it is easy work almost anywhere to grow useful onions. The first step in preparing the soil is to make it loose and fine throughout, and as far as possible to do this some time before the seed is sown.

MANURING

As almost any soil will suit the onlon, so also will suit almost my kind of manure, provided that it be not rank or offensive, This strongly flavoured plant likes good but sweet living, and it is sheer folly to lead the ground for it with coarse and stimulating manures. Yet it is often done, and the result is a stiffnecked generation of bulbs that refuse to ripen, or there may be complete failure of the crop through disease or plethora. But any fertiliser that is at hand, even the sweepings of poultry yards or pigeon lofts, may be turned to account by the simple process of first making it into a compost with fresh soil. and then digging it in some time in advance of the season for sowing, and in reasonable but not excessive quantity. All such aids to plant growth as guano, charcoal, and well rotted farmyard manure, may be used advantageously for the onion crop; but there are two materials of especial value namely, that are universally employed by large growers, both to help the growth and prevent maggot and chanker. These are the lime and soot. These are sown together when the ground is finally prepared for the seed, and in quantity only sufficient to colour the ground. exercise a magical influence, and those who make money by growing onions take eare to employ them as a necessary part of their business routine.

SOWING THE SEED

Having been well dug and manured in good time, the top spit only should be dug over when it is finally made ready for the seed. The work must be done with care, and the beds should be marked off in breadths of four feet, with one-foot alleys between. Break all lumps with the spade, and work the surface to a regulor and finely crumbled texture. Light soil should be trodden over to consolidate, it, and then the surface may be carefully touched with the rake to prepare it for the seed.

tember and October are not usual iths for sowing the seeds, but in several is seeds are sometimes put even in ember. The seed bed are germinated few days and begin to grow vigorously when the plants are up a few inches, 4 inches apart in rows. The ground to be laid out for irrigation, and water in once a week in dry weather.

Space the rows from nine to twelve ies apart, according to the character he sort and the size of bulbs required. drills must be drawn across the bed, at t angles to the alleys, for when drawn other way it is difficult to keep the ind properly weeded. For a crop of ins intended for storing, the seed should only just covered with fine earth taken a the alleys and thrown over, after th the drills must be lightly trodden, surface again touched over with the , and if the soil is dry and work: ly, the business may be finished by ly patting the bed all over with the of the spade. If the ground is damp neavy, this final touch may be omitted, the onion makes a peak grass that not easily push through earth that is ed over it. But speaking generally, an in bed newly sown should be quite oth as if finished with a roller. To beginner this will appear a protracted complicated story, but the expert will st that onions require and will abuntly pay for special management,

As soon as possible after the crop is ble the ground between should be deliely chopped over with the hoe to check weeds that will then be rising. Immeely the rows are defined a first thinnshould be made with a small hoc, care ig taken to leave a good plant on the und. Keep the hoe at work, for if ds are allowed to make way, the crop be seriously injured. When onions doing well they lift themselves up and on the earth, needing light and air n their bulbs to the very axis whence roots diverge. If weeds spread ongst them the bulbs are robbed of air light, and their keeping properties are aired. But in the use of the hoe it mportant not to loosen the ground or to w any earth towards the bulbs. Really onions are rarely produced in loose and, hence the necessity for care in the use of the hoe. Watering is not $_{0\,fh_{12}}$ needed.

If an attack of mildew is occurred, a dusting of flowers of sulphur will professive if applied immediately the discourage appears. Sulphide of potassium, one of to a gallon of water, is also a reliable remedy.

HARVESTING

The harvesting of the crop require- 1: much care as the growing of it. It goes well, the bulbs will ripen natural and being drawn and dried on the gre for a few days may be gathered up and topped and tailed or bunched as may most convenient. But there may be a litt hesitation of the plant in finishing grow 5 the result, perhaps, of cool moist weath when dry hot weather would be better. this case the growth may be checked in passing a rod (as the handle of a rake example) over the bed to bend down tops. After this the tops will turn yelland the necks will shrink, and advant ... must be taken of fine weather to draw and onions and lay them out to dry.

As to keeping onions, dry, cool, and airy place will answer. But if a difficulty arises there is an easy way out of it, i: onions may be hung in bunches on an order wall under the shelter of the caves of and building, and thus the outsides of bar and stables and cottages may be converted into onion stores, leaving the inside for for things that are less able to take of a of themselves. During severe frost the must be taken down and piled up anywhere in a safe place, but may be put on the? hooks again when the weather softens, at a slight frost will not harm them in the least, and the wall will keep them composed tively firm and dry. When the best parof the crop has been bunched or roped, to remainder may be thrown into a heap in a cool dry shed, and a few mats put one them will prevent sprounting for at leaf three months. But damp will start the into growth, and the only way to say them is to top and tail them again, and store as dry as possible in shallow baske s or boxes.

PLANTAIN

The plantain, or "Musa paradissical" as the scientists call it, is perhaps nowhere

he world so much associated with relias in India. No auspicious ceremony estival of the Hindus can be commencwithout the customary high religious em unless its utility is undoubted and at it may be easily assumed that the itain has always proved to be of lense value to Indians. The presence vild and cultivated plantain in India its to the fact that plantain is both a ve of India and that its cultivation in country dates from prehistoric times. ral varieties of plantains are to be id in India and abroad but it is pretty ain that all of them proceed from one I stock. There are, at present about nty varieties of plantains which under rent local names are well known both forthern and Southern India. The term nana" is generally substituted for ttain outside India, but to avoid conon, it should be applied to those cties of plantains only which are eaten and uncooked.

As a result of modern investigation food materials, eminent experts have e to the conclusion that it would be I to find another food product which cesses, weight for weight, the same titive value as plantain. There are still tries in the world, e.g., the great lake ons of Africa and certain portions of tral America where people mainly and on ripe and unripe plantains for rordinary food. Even during the late millions of men of Central Europe ad in fried banana products an importauxiliary in making up their diminish-food supply.

As a food product plantain is used in eral ways. The small ripe, sweet ydrafed fruits find a large sale under name of banana figs. Large sized ts, richer in starch than sugar, are le into meal or flour much used in ed products and confectionery. A jelly lso prepared from the ripe fruits. In a the mature but unripe fruits of a ety of plantain (Kanchkela), the pith the abortive flower at the end of the rescence (Mocha) are all used as inlients of several much relished dishes. lower portion of the stem of the itain contains a large amount of starch provides food to the poor in times of line and scarcity.

Although plantain is to be found everywhere in India except in the driest and coldest regions, it is difficult to form an estimate of the area under it, it being included in the Agricultural Statistics in the general heading of "Orchard crops." In the Presidencies of Bengal, Bombay and Madras and in Orissa the average of plantain must be large judging from the number of gardens met with on every side. It cannot however, be said that the merits of the plantain have been sufficiently appreciated in India. In comparison with the West Indies where banana forms one of the most important sources of wealth very little attention has been paid to the production of plantains in India. Wet plantain is not a difficult crop to grow. A large number of varieties of soil will suit plantain, provided there is enough moisture and no chance of water logging. Some of the best plantations are even near the sea coast but plantain grows equally well hundreds of miles inland. Protection from high winds is however, always necessary. While it is very much desirable that there should be ample extension of the area under plantains extension of area only will not serve the higher economic purposes unless determined efforts are made to utilise plantains on modern lines. Following is a list of some of the popular varieties:— Martaman, champa, chini-champak, kanthali, anupan, ram-rambha, kanai-bashi, agnishwar, Bombay, Kabuli, Singapuri,

SOIL

The banana will grow on moist soils. It delights in the climate of the coast, but will grow whenever it can get plenty of water and where it is protected from hot drying winds i.e. to say clayloam soil not subject to water-logging and situated close to tank, jhil, or canal can be chosen for the cultivation of plantain. The land is next ploughed and cross-ploughed several times.

CULTIVATION

The banana plant has no seed, but is propagated by young plants which bud from the under ground tuberous stem, or "bulb," as it is called, of an old plant. This bulb at first gets all its food material from the parent bulb but very soon forms leaves and roots of its own. Its first

leaves—second leaves—are very long and narrow as compared with those developed later. When the young plant is 6 or 8 months old, it is about 9 or 10 feet high, and its own bulb is 8 or 10 in. across. This is cut clean away from the parent, and the roots trimmed off. It may be planted as it is but for convenience of carrying and to prevent its being blown over before its roots anchor it, it is cut down to within 6 in. of its bulb. This bulb soon shorts, both from the centre and from eyes all round. If a bulb is cut vertically, the eyes or young buds can be traced, clearly showing that the bulb is a stem structure.

The suckers of desired variety are not collected and these are planted in a row 12 feet apart each way in the beginning of the rainy season. The pit should be made a cubit deep and manured.

MANURING

The banana is a gross feeder and needs liberal manuring, best given in three doses, one month, two months, after planting, castor cake 10 fbs. plus flsh 15 fbs. per tree is an excellent manure. Castor cake 4 fbs. sulphate of ammonia 1 fb. sulphate of potash 4/5 fb. and calcium superphosphate 7/8 fb. has proved useful. Green manuring is desirable once a year and the soil must be kept well hard.

The first crop comes in 10-12 months from planting, and is poorer than any succeeding crops. Succeeding crops in well treated plantations should come on every 5 months and be twice the weight of the first crop. When a banana tree has fruited it dies and must be cut out; its makers replace it. There is an art in regulating these suckers. One should be half grown when the old tree is fruiting, and another should be about 2 feet high-others being cut out. A successive of fruiting trees is thus obtained and overcrowding prevented. The number of fruits per tree is greatly increased with good manuring and cultivation, and is decreased by neglect. After 5 years a banana plantation should be cut out and the land given to other crops for 3 years before are put on it again. The fruit bunches severed when the fruit is fullgrown and is hung up in a dark cool place to ripen. In the ripening process the starch of the fruit changes to sugar, and proportion of pulp to skin increases. A

disease (black rot) due to the fun Gloesporium musarum occasionally atta the fruits both on the tree and in st It can be prevented by spraying wammoniacal copper carbonate.

PINE-APPLE

The pine-apple is regarded as one the most delicious fruits met with tropical regions. It is known to botar as Ananas Sativa, a familiar plant be native of South America from when appears to have been dispersed all at the world and acclimatised in a tropical and sub-tropical countries. Spaniards called it Pinas from its semblance to the pine-cone but the Peguese named it Ananas being adapted their own tongue its Brazilian name Name

The pine-apple was first introduced the West coast of India by the Pos guese, but it rapidly migrated the courand attained its greatest perfection the Eastern Peninsula, From Calcu through Eastern and Northern Bengat Assam and Burma may be said to be Indian habitat yielding a profusion of m delicious fruit, though it also occurs ! and there throughout India, and is vi abundant on the West Coast. It is the not by any means exclusively in the litte tracts, nor within the inundated areas India, that the pine-apple has attained greatest perfection, but rather considably inland and on the dry, sandy lost of the lower hills and tarai, though tracts of country subject to a high and rainfall. "A" warm, moist atmosph and a well-drained sandy loam we appear, therefore, to be the essentials ! success with pine-apple." (Watt).

DIFFERENT VARIETIES OF PINE-APPIA

There are various types of pine-approach cultivated in India of which the follow are generally recognised:—

1. The Bengal variety is not by a means an indifferent fruit whe grown in a situation exposed to be sun. The large intensified frue sold in quantities are nearly produced under the shade of the shade conducting as many perhaps to the size as it tends detract from the flavour.

- The Ceylon is decided to be the finest in flavour of all. The fruit is rather large, greenish when young and of an orange colour when ripe.
- The Sylhet or Koomlah variety yields a small fruit with very few but exceptionally large eyes.
- 4. The Dacca variety produces a remarkably smooth pine with white eyes.
- The Penang; one or two sorts introduced from Penang differ but little from the ordinary Bengal kind,
- Conical-crown: a curious variety also introduced from Penang.
- 7. Streatifolia: a variety introduced from Java.

SOIL: ITS PREPARATION & MANURING

The best suitable soil required for the ultivation of pine-apple is a sandy loam ith good drainage and next to it come be free sands and gravels. Clay of all inds and badly drained lands are unsuited. a good proportion of lime is advantageous nd also the animal manures perfectly otted should be put near the plants as it roduces a beneficial effect to their growth. ut rich soils and strong manures are uite unsuitable for its cultivation as pinted out by Firminger that the plants lay rot and perish from an over supply [manure. Further that soil thoroughly ghtened with leaf-mould, well decayed awdung and sand is said to be the best a which pine-apples will thrive to rfection.

SEASON FOR PLANTING

The proper season for planting out ne-apples is in the month of August. A oil should be chosen for them where they ay be fully exposed to the sun. They would be placed in rows at a distance of 3 et apart between each row and at a stance of two feet from each other in the row. "A better plan would be to lime it the land in rows of 6 feet apart, and plant the suckers at a distance of 3 feet the rows and after the first crop a few the suckers could be left and then this ould yield more than double fruits for the cond crop." (Nicholls). It is most

important to have fairly large spaces between the rows since the plants being spiny the necessary room for working the land has to be provided. Moreover, after uprooting and preparing the land for relining it is possible to set the new plants on the inter-spaces not occupied by the former crop, and thus to continue cultivation on the same land very nearly indefinitely.

PROPAGATION

When the fruit has formed, numerous suckers will be found around the parent stem. These are perfectly selected for propagation, though, of course plants may be raised from the crown of leaves taken from the fruit, and even from the black seeds often found within the fruit itself.

The selected suckers or the green crowns from the fruit are planted in the sand during the rainy season and when they have grown a few inches, they are transplanted on the prepared soil in rows. The oftener the plants are transplanted, the more will their growth and quality be improved.

WATERING

After the rains, no water should be given to the plants till they have set their fruit in February and March, when, as well as during all the time that the fruit is swelling, it should be bestowed abundantly. It is important also that at the same time the leaves should be well cleansed by occasional drenchings from above, in order to remove the dirt and dust that would otherwise clog their pores, and so impede the passing of the water they imbibe at their roots.

TIME OF FRUITS

The pine-apple flowers in February and March, and ripens its fruit in July and August. After which, in September and October it makes its principal growth. It sometimes happens that plants instead of making growth break into flower, and so produce fruit in the cold season. This is by no means desirable, as the fruit produced, unseasonably does not ripen for want of sufficient heat, which is necessary for this purpose; hence it is almost invariably acid and uneatable. Young-

roots and suckers not required should be removed from the plants as soon as they make their appearance.

The pine-apple is much improved by having the leafy crown of the fruit twisted out when about 4 inches in height, and a piece of the tile laid upon the top. In Bengal the usual method carried out is that the crowns are cut off when nearly full grown but this reduces the flavour to a great extent.

HARVESTING AND METHOD OF TRANSPORT

When the fruits are about to ripen fully, they are cut off with a sharp knife through the middle of the stalk. In despatching to a distant place each fruit should be wrapped in straw or paper, and deposited if possible in a separate compartment for two or three fruits. When either bruised or over-ripe, fermentation takes place and the entire consignment may be ruined through the presence of one fermenting fruit.

PROSPECT

In recent years much attention has been paid to the study of the varieties and races of pine-apple, as also to the methods of cultivation and markets of supply and demand. In India, while the plant is extremely abundant as a fruit grown in gardens and in some localities even no effort has been put forth either to improve the quality or to develop on a commercial scale, the industry of pine-apple growing, which it would appear might be cultivated with advantage to India and profit to those concerned.

PAPAYA

The Papaw or Papaya known to Botanist as Carica Papaya is a familiar plant growing abundantly in the plains of India and Ceylon. It is said to be a native of South America from where it is distributed in course of time to the other parts of the globe. Although it fruits satisfactorily in the plains, yet it does not grow well in the hills in colder regions except in South India, where it thrives best as in the plains even at a height of 4,000 feet above sea-level. In foreign countries it is taken as a profitable commodity. For this reason it is cultivated with much care in large tracts of Phillipine Isles, Brazil,

Florida and California. But in India condition is quite different. Here fruit a ture is entirely neglected and the perare hankering after services.

But in spite of this fact it is proportion discuss in this article the cultivation papaya from the economic point of y so that a number of our unemployed you may pay their attention to fruit cultition.

VARIETIES

There are numerous varieties papaya in cultivation. There are so mammoth varieties the fruits of which weigh about 5 to 6 pounds each. Amounthe best varieties are the Ranchi, Cey Singapore and Moulmein fruits, ordinary Bangalore and Madras fruits also sold in the market. In Bangal many gardeners sell very good playwhich bear railway journey very well, can be successfully transplanted.

PROPAGATION, ETC.

The papaya grows in all soils climates in India. But it does very welred sandy loams. Stiff clay and be drained swamps or marshy lands are good. The papaya can be easily raised sowing seeds. Choose a good fully i fruit which is full of flesh, and in which hollow seed cup is very small contain very few seeds. Take out those see wash them with clear water; and t mix them with some good fine ashes earth and dry the seeds in the sun. A about 15 days, sow these dry seeds i seed bed in a nursery about one foot ap-In about two months, we get small parplants about two feet high. These she be removed with their roots carefully transplanted in the open fields. The l in which the papaya is to be gr permanently must be well ploughed onc January or February, and a second t one menth later. Afterwards dig pit: the ploughed land, 2 feet long, 2 feet br and 2 feet deep. These pits should be to 15 feet distant from each other 1 ways.

TRANSPLANTING

Plant one seedling in each pit. W planting, throw into the pit 5 to 10 pour of bones. Then fill up the pit by mix

e basketful of well decayed cowdung or orse manure or road sweepings. Then after the plants. For about a month after enting water plants regularly two or tree times a week if there is no rain. It is seedlings would then have established conselves and rooted freely. The best con for transplanting is from July to the drof October. But being hardy plants, copt during the months of May and June, in it is very hot, they may be planted any time.

It is to be noted here that as a papaya int possesses only one main root with a side roots, which penetrates deeply into ground, it is very difficult to transplant without any injury to the plant. So particular attention should be given in applanting.

MANURING AND IRRIGATION

If the gardener wants to have good y sweet fruits in abundance, the papaya was must be irrigated during the hot onths and also when the young fruits are during, about once a week in light day soils or loams; and once in 10 days, a clay or other retentive soils.

The best manure for papaya plants is ese dung, which is only one or two nths old. Every year the soil round in tree to a distance of about two or the feet should be dug to a depth of about ii foot, and one basketful of horse dung ighing about 25 lbs, mixed with the soil. is mixture is put into the pits and sed firmly. Horse dung is a heating mure, and is available as plant food very in after it is applied. Therefore it is essary to water the plants well or rigate the garden, soon after the manure The manure is generally applied. plied from November to February ing the cold weather.

MALE AND FEMALE TREES

Among the papaya, some trees bear by male flowers: and others bear only male flowers. The male trees are barren will never bear fruit. In the male tree also, the female flower must fertilised by the pollen of the male over. Therefore it is necessary to the a few male trees also in the male apaya garden. One male tree can

fertilise 100 female trees. The male tree can be distinguished from the female tree as soon as it begins to flower. The male flowers are borne in clusters in long pendulous bunches or racemes; and are fragrant. The female flowers on the others hand, though bigger, have only a very short stalk and have little or no smell.

OUTTURN

Each tree yields on an average about 100 fruits a year, which weigh about 200 to 300 lbs. Though the trees bear all the year round, the best fruits are got in the cold weather, between the months of October and March. To obtain good choiced fruits, it is best to thin the fruits i.e. to remove about one-third or half the number of fruits growing on the tree; when they are yet very small and tender.

PROPERTIES AND USES OF PAPAYA

Besides affording a valuable vegetable fruit, a most valuable digesting ferment known as papain or vegetable pepsin can be easily manufactured from the milky juice of the fruit. This papain is recognised by medical authorities both here and abroad and is largely used by them. We get about one gramme of milky juice from each fruit. So from one acre yielding about 50,000 fruits we get over 60 fbs. of juice, from which we get about 20 lbs. of dry papain. In Madras the price of 1 ounce of papain made in Germany is Re. 1/-. The papaya tree wards off mosquitoes and thus affords protection against malaria.

The fruits are delicious and contain vitamins. The fruits cure enlargement of the spleen and many other diseases. The ripe fruit is eaten by all classes of people and is esteemed innocent and wholesome. A wonderful range in quality is observable. In some localities such as Hazaribagh in Chota-Nagpur and Gauhati in Assam, the fruit is large and very sweet, in others it small, coarse and hardly edible. The better qualities of the ripe fruit are eaten with a little sugar and fresh lemon juice, and by some people with pepper and salt.

The papaya has also its industrial use. The milky juice of this fruit is used in softening tasar cocoons and thus facilitating their being reeled, has recently received some attention. Moreover as already

mentioned above from the papaya juice vegetable pepsin or papain is obtained.

BIBLIOGRAPHY

- Principles of Agriculture For Bengal. -F. Smith.
- Text-Book on Indian Agriculture. -J. Mollison.
- 3. Manual of Agricultural Chemistr
- Gollan's Indian Vegetable Gard. -Norman (;
- Firminger's Manual of Gardeni -W, Bv_t for India.
- Handbook of Indian Agricultus 6. -N. G. Muker

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-PHARMACEUTICAL RECIPES

HAIR TONIC

Beta naphthol	10	gr.	,
Quinine hydrochloride	5	-	
Resorcin	10		
Bay rum	5		ðz.
Distilled water to make	20	41	
Mix all together in a stoppered			**

STAINLESS IODINE OINTMENT

Iodine	1	02.
Oleic acid	4	
Soft paraffin	14	
Hard parailin	1	

Dissolve the iodine in the oleic acid and intimately with the paraffin.

SCURF POMADE

Salicylic acid	30	grains.
Borax	15	
Soft paraffin	1	02.
Balsam of Peru	30	grains.
Oil of Cinnamon	3	drops.
Oil of bergamot	10	
Mix.		

KIDNEY PILLS

Powdered squill	ł gr.
l'owdered digitalis	1 ,,
l'otassium nitrate	2
Extract of buchu	<u> </u>
Oil of juniper	🖠 drop.
Make into one pill.	

These pills are diuretics and stimulants of or urinary tract constitute the active princi-

COUGH DROPS

Brown sugar	10 lbs.
Tartaric acid	2 oz.
Cream of tartar	1
Water	3 pints.
Anise-seed flavouring	q.s.

Melt the sugar in the water, and when at a orp boil add the cream of tartar. Cover the for 5 minutes. Remove the liq, and let the ar boil up to crack degree i.e., if a quantity syrup is allowed to drop on the cool floor it once sets to a hard mass. At this stage turn the batch on an oiled stone slab, and when the chough to handle mould in the acid and ouring, pass it through the acid drop roland when the drops are chipped up, and ore sifting, rub some leing sugar with them.

PAIN BALM

Yellow vaseline	10	parts
Methyl salicylate	2	
Oil of Cajuput	2	,,
Oil of Eucalyptus	2	"
Menthol .	2	
Camphor	2	
Wool fat	20	

Mix thoroughly in a stone mortar and put in wide-mouthed bottles. It may be rubbed gently over the affected parts.

NEEM, CHAULMOOGRA SOAP BY COLD PROCESS

Coconut oil	20 srs.
Castor oil	2 ,,
Neem oil	8 ,,
Chaulmoogra oil	1 sr.
Caustic soda lye 36°Be	131 srs.
Soap green	2 dr.
Now take boiling water q. s.	to dissolve :
Ichthyol	1 tb.
Thyme off	4 oz.
Oil ettronella	4

Put the oils into a suitable vessel, mix the medicines and stir in the lye. Then add the colour and stir until the mixture thickens. Now pour into the frame.

TONIC TABLETS

Calcium hypophosphites	50	grains.
Manganese hypophosphites	25	.,
Potassium hypophosphites	25	n
Iron hypophosphites	25	
Quinine hypophosphites	124	. n
Strychnine	- 8	grain.
Potato starch, in powder	200	grains.
Sucrose, in powder.		_
the part of the pa	050	

Mix the hypophosphites of calcium, manganese and potassium with strychnine, and grind well together in a mortar. Dissolve the iron hypophosphite in a little water, granulate the mixed powders with the solution, and dry the granules. Powder the dried granules, and pass together with the starch, through a sieve, and make up to the required weight with sucrose. Make into 800 sugar-coated tablets.

LIME PEPSIN

Pure pepsin 260 gr.; distilled water 3 oz.; glycerine 3 oz.; alcohol 1½ oz.; refined talcum ½ oz.; lime juice, enough to make 1 pint. Mix pepsin with 8 oz. of lime juice, Dissolve in water and add glycerine and alcohol, and finally the remainder of the lime juice. Mix well talcum and let stand for a few days, stirring it occasionally. Filter. This will make 3 seers of syrup. This is a very good preparation for promoting digestion.

-Recipes for Small Manufacturers

KHUS KHUS ESSENCE

Procure 12 oz. of khus khus root. Free li from dirt and pound it finely. Now soak the powder in 16 oz. of alcohol and keep into a wide-mouthed stoppered bottle. After a month filter through filter paper and keep in bottles for use.

ROOF STOPPING

Rosin	56	lbs.
Paraffin wax	20	H
Calcined flint	40	21
Raw linseed oil	3	gallons.
Red lead	3	lbs.
Wood tar	3-	10
Salked lime	3	10

Boil the oil with the red lead, melt in the rosin and the wax. Heat the tar and lime together, add to the oil mixture, then add the calcined flint and thoroughly mix.

PINEAPPLE VINEGAR

Pare the pine-apple and cut into slices. Pound the slices on a clean stone slab and express the juice. Strain and take 10 srs. Put into an earthen vessel, and apply heat. Remove when it bubbles up and strain when cool. Fill a wide-mouthed jar with it, close the mouth well and place in the sun and dew. After 10 or 12 days a film will form, then strain and put back again in the jar. Finally when the film ceases to appear, strain and bottle.

BENGAL CHUTNEY

One pound of tamarind pulp, one pound of sultana raisins, the grated rind and half the juice of 12 lemons, one pound of tomato pulp, one pound of minced apples, a quarter of a pound of peeled garlic, six chopped onions, half a pound of red chillies, one pound of ginger in powder, one pound of moist sugar, and four quarts of strong vinegar. Mix the whole thoroughly together and keep it for a month in a warm place to ferment; stir it occasionally, and then put it into small jars.

ASBESTOS CEMENT

Asbestos cement is generally used when the vessels are exposed to a high temperature and also when the cemented vessels are intended to hold corrosive acids.

1,		
Asbestos powder	2	parts.
Barium sulphate	3	
Sodium silicate	2	

By mixing these substances, a cement may be obtained which will not be affected by nitric acid. But if the cement is to be exposed to bot concentrated acids, the following mixture is recommended.

11

Sodium silicate	2	part-
Fine sand	ī	part.
Asbestos powder	1	

Both these cements take a few hours to If quick setting cement is required use 1 sium silicate instead of sodium.

ARTIFICIAL IVORY

Mix 8 parts of shellac with 32 parts of monia solution of specific gravity 0.991, shake into solution in revolving cylinder about 5 hours. The result of the oper will be a complete solution of the consistenthin syrup. Add to this 40 parts of zinc omix thoroughly with the hand, and then the mixture in a colour-mill. The ammonthen expelled by heating. The residue is pletely dried upon glass plates, ground five a mill, and pressed into moulds with a preof as much as a ton to the square inch, as increase of temperature to about 400 F. product when taken from the mould, is pure white colour and closely resembles in

STICK COSMETIC

Benzoated lard	14	07
White wax	3	
Oil of bergamot	1	di
Oil of carsia	10	311
Oil of thyme	5	,,

Melt the wax, add the lard, and stir creamy; then add the perfume and pour suitable moulds,

POLISHING JUTE TWINE

The following recipe reproduced from dian Textile Journal is for a size suitable polishing jute twines:--

Starch 8 parts; glucose 3 parts, water parts. Place the starch in a large tub and cold water gradually. Next add the glucose it and boil for 20 minutes. Then make borax 1½ parts, and tale 2 parts, lithopoparts, gelatine 3 parts, and water 50 parts.

Heat the mixture in order to dissolve borax and gelatine. Then combine the two tures well stirring the while, and boil the w for 20 minutes. Use when cold. Add sale acid 1 per cent, if it is to be kept. Litho is a mixture of sulphide of zinc and ba. sulphate. The following recipes are for suitable for finishing or polishing plaited cords, etc.: -45 gallons of water; 10 lbs. At can gum; 1 lb, castile soap; 1 oz. borax; 3 dextrine; 30 lbs. corn starch. Fill up the be with 45 gallons of water, and bring to a after adding the borax. Mix the starch in pails with cold water, then add to the beagain bringing to the boiling point. Mix dextrine in a small quantity of cold water. add this also. Now boil the mixing for minutes, or until thoroughly dissolved. En into clean pails and use when cold.

-READER'S BUSINESS PROBLEMS

Reader's business problems will be discussed in these pages. We invite the reader to write also difficulties. As the department is in charge of an experienced businessman who is ally adept in dealing with such problems and to whom experiences of a large number accessful businessmen are available, his replies will lead the enquirer to a successful or. These replies will be published in the paper only and cannot be communicated by

[ARTING A MAIL ORDER BUSINESS ON SMALL SCALE

770 K.P.R., Calcutta-Writes how to cona small mail order business.

The small mail order man does not necessly need to make a large success of his eness the first year or two for it is then that a getting his education in this line, and it is little education worth having—be it in mail order or any other line—that does not time, money and labour. In this respect emall mail order man differs from the other res in the mail order business as it is a dar business with them and they cannot to spend any time or money in the pursue of experience and so usually enter the with an experienced management or backtor both.

The first attempt that the small mail order usually makes in the selling field is in any some novelty that he has reason to be will appeal to some class of trade with the has some acquaintance. Of course characteristic are apprehensions of competition in the maid that from various sources. The large closuc houses handling nearly every kind of the may compete with him the mail order influent of houses which sell by means of man should be noted. But there is not a hanger of coming in contact with these classes. The most dangerous competition in all probability come from his rival, the mail order class.

UNCIPLES OF RETAIL BUSINESS

1132 R. L. D. Bombay—Desires to be entened on how a retail business can be essfully carried on.

the points which a retailer should bear in 4 in winning new customers and effecting may be summarised thus:—

- (1) To treat all who enter the shop, ther they purchase or not, with the same tence and attention as the most favoured other, for they may become such in the .cc.
- (2) To meet the incomer with a pleasant coming look and word as a gentleman would ived an acquaintance at home.
- (3) To have an ample supply of sample s so as to avoid handling goods unnecessity; but, when the buyer has made a selection of what he would like to see, an expert other spares no trouble to give him an bortunity to examine the goods himself.

- (4) A good retailer does not show indifference whether the customer purchases or not, and does not urge him to buy what he does not seem to want nor manifests so much anxiety to sell as to create the impression that there must be good profit in the sale,
- (5) A good retailer talks enough to explain what the customer ought to know as to the cause of difference in price and value of various articles of merchandise; but at the same time, he should avoid too much talking especially on outside matters during a negotiation of sale. Discretion in speech is more than eloquence.
- (6) A good retailer pays deference to the opinions of the customers and does not make them feel that he knows everything and do nothing.
- (7) A good retailer does not enter into contentious argument with customers, when they deprecate his goods, answers back rudely, but either insinuates that they are trying to cheapen the merchandise, or expresses regret that the article does not suit.
- (8) A good retailer calls attention of his customers to the special bargains he may have to offer and does not expatiate on them as something unprecedented and wonderful, on the contrary, creates the impression that bargains are nothing unusual or rate in that store.
- (9) A good retailer endeavours to ascertain the price the customer expects to pay and does not begin by showing something much higher in prices and superior in quality and then goes down to the grades than can be offered at the price named lest the customer becomes dissatisfied with the inferior quality and wishes to look further,
- (10) A good retailer who feels that a price is necessary to effect a sale does not wait for the customer to make an offer but proposes a reduction voluntarily as a favour or for some friendly reason and not as a rule of the establishment.
- (11) A good retailer has π quick appreciation of the wants of buyers and does not continue with equal praise on all kinds of style of goods to all persons but catches at the fancy of the customer and presses delicately upon that; or, if it is an unjudicious choice, he points out its defect and produces a more suitable article and thus inspires confidence.
- (12) A good retailer as a thorough knowledge of human nature, courteous manners, and a ready tact.

-BRIEF QUERIES AND REPLIE

Questions of any kind within the scope of Industry are invited. Enquiries or replies from experts will be published free of charge in serial order. Questions are replied by post on resoft As. 8 stamps for each question. Subscribers outside India are requested to send two ternational Reply coupons for each question. In order to facilitate the work of Editor's Dement and to help prompt action the readers are requested to send enquiries in separate leaves.

749 J.N.S., Puri—For pane glass write to United Provinces Glass Works Ltd., Bahjoi, Moradabad and Victoria Glass Works Ltd., 130, Mechuabazar Street, Calcutta.

750 E.M.I., Dacca—We have no book on sheet metal industry. You may however write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

752 P.N.P., Umar—For Japanese machine enquire of Chimanlal Desai & Co., 54, Bentinck

Street, Calcutta.

753 A.S.F., Jodhpur—Crown corks may be had of Crown Cork Manufacturing Co., 1, Umakanta Sen Lane, Calcutta. For Crown cork making machines enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

754 K.C.I., Khagaria- Process of manufacturing papain will appear in due course, For books enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta. For machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

756 N.N.P., Bankura--Process of manufacturing sonp will be found in Manufacture of Soap published from this office, price Rs. 4/9/including postage. Process of manufacturing alta will be found in Indian Perfumes, Essences and Hair Oils published from this office, price

Rs. 4/9/- including postage.

757 A.S.F., Karachi—Process of manufacturing lead pencil will be found in Industry Prize Articles Vol. 1 published from this office, price Rs. 2/- including postage. Wirenails are manufactured from wire by means of a machine which may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. You may consult The Plastic Industry price Re. 1/-. You may also consult Chemical Industries of India published from this office, price Rs. 3/9/- including postage.

760 H.N.R., New Delhi Detailed information regarding artificial pearl manufacture is

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763 P.S.M.S., Bowringpet—Quillaya may be had of Banshidhar Dutt, 126, Kh

patty Street, Calcutta,

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769 B.A.P., Madras For starting any of business you require capital large or You may start a business with a small capbut extend it gradually.

770 H.V. Madras—For galvanised ; and fittings enquire of the following flux Sankar Pipe and Industries Works, 49, Dr. Addutt Rd., Howrah; Jogendra Nath Chatteles & Sons Ltd., 21, Maharshi Debendra R. Calcutta 7 and Indian Engineering & Fill Works, 115, Netaji Subhas Road, Calcutta

772 R.A.E.W., Labore—Mica speets of be had of Calcutta Mica Corporation, 161, Mica Babu Street, Calcutta and Indian Mica Supply Co. Ltd., 95, Lower Chitpur Education.

773 P.R.A., Pudukad—Paper pulp malbooks may be had of Ali India Village Indu. Association, Maganyadi, Wardha, C. P.

775 M.R.S., Ajmer—For blocks enqui-N. De, 1-1, Bhim Ghose Lane, Calcutta.

776 M.T.C., Rangoon Following formula of laundry blue tablets. Ultranblue 6 oz.; sodium carbonate 4 oz.; gluce oz.; water sufficient quantity. Make a paste, roll into sheets and cut into table

777 J.S., Chapra—Lead pencils are infactured by the following firms: F. N. Go & Co., 12, Belliaghata Road, Calcutta; C. Law & Co. Ltd., 2, Cornwallis Street. Calcullindusthan Pencil Ltd., 428, Kalbadevi I Bombay and Madras Pencil Factory, 5, Street, G. T., Madras.

781 L.S.P., Bhadrak—A good formul scented sesame or til oil appeared in March issue of Industry.

784 D.P.B., Calcutta—Formulas of sive paste will be found in April 1951 issumbustry.

785 S.V.W., Bombay—Following is a mula of textile crayons:—French chalk 20 per pipeclay 20 parts; white curd soap 6 per Make into a stiff paste with water and drive

786 H.H.S.C., Choharpur-Formulas diup, tooth powder, etc. will appear in due course.

787 T.P.M., Calcutta-There is no arrangement for giving practical training in rabber baloon manufacture and ebonite tube manufacture. You should try to be an appren-

in a rubber factory.

788 M.I., Calcutta—You may consult Small Industries published from this office, e Rs. 2/- including postage. You may also consult our other publications such as Indian P. fumes, Essences and Hair Oils; Home In-tries; Manufacture of Syrup and Cold : inks. etc.

789 M.P.C., Rani—In order to improve across business you should take agency of known goods only. Then you should approach beth wholesale and retail dealers for selling : · articles for which you have taken agency, 791 C.L.K.C., Bulandshahr-Formulas of

ink will be found in April 1950 issue of

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793 Y.N.B.C., Mettur-Confectionery maclines may be had of Small Machineries Mfg. (a), 22, R. G. Kar Road, Calcutta. Fruit essences may be had of Essence & Bottle Supply Agency, 1), Radha Bazar Street, Calcutta and Paradise Parfumery House, 7, Colootola Street, Calcutta.

J.B., Aligarh - For Kinemascope enquire of Bepin Behari Dass & Grandson, 63F-G, Finha Bazar Street and Sat Cowrie Dass & Co., 1-6, Old China Bazar Street; both of Calcutta.

795 B.U.T.C., Mandalay-Brown colour of powder is due to the presence of impurities to the powder. Impurities may be ordinary else or iron compound. You have to eliminate ". impurities by washing several times.

798 M.C.M.W., Morvi-Acids are manufollowing firms: -Bengal Acid & Chemical Manufacturing Co., 217, Bagmari Final; Bengal Acid Manufacturing Co. Ltd., 66, a 57, Bagmari Road; Bengal Chemical & i armaceutical Works Ltd., 164, Manicktala Black, Netaji Subhas Road; all of Calcutta. mate of soda is manufactured by Calcutta M. reral Supply Co. Ltd., 31, Jackson Lune; Periab Silicate Works, 28, Bagmari Road and · · · Durga Silicate of Soda Factory, 22, Bur-Street; all of Calcutta.

799 S.M., Akola -Process of manufacturing betric heater coil will appear in due course, 803 N.H.T., Bombay-Following is a fori of transparent paper varnish :-- Copal 3 oz.; caphor 11 dr.; Turpentine oil 12 oz.; Oil of we inder 3 oz. Dissolve the copal and camphor the oil of turpentine and then add the oil 1 layender.

T. . . et 2520911 ha CHOTBOUDHANG HEESUN COT PROPRIATABLICARA

804 H.L.R., Agra-For watch straps of plastic enquire of International Sales Corporation, 23/90, Connaught Circus, New Delhi; K. A. Zaveri & Co., 89, Princess street, Bombay.

806 H.S., Bahanpur-For selling beeswax and honey you may negotiate with Banshidhar Dutt, 126, Khengrapatty Street and Indian Herb Store, 31, Mullick Street; both of Calcutta.

807 B.K., Hardwar-For pumps to be used for agricultural purpose enquire of Hassanally & Son, 36, Netaji Subhas Road; Indian Pump Co., 190C, Rashbehari Avenue and Mirlees Watson Co. Ltd., Grosvenor House: all of Calcutta.

808 G.S.R., Calcutta-You may negotiate with the following institute: - Indian Institute of Electronic Technology, 8B, Raja Naba Krishna Street, Calcutta.

813 H.I.C., Gadag-We have no book on refrigeration mechanism. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co. Ltd., 3 & 4, Old Court House Street, Calcutta.

815 R.L.S., Kakinada—To communicate with any querist write him with number and initials care of Industry when your letters will be duly redirected.

816 B.I.W., Poona-For saffron enquire of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta and Indian Herb Store, 31, Mullick Street, Calcutta. Addresses of Spain are not available.

818 M.M.A.M., Rambukkana-For fountain pen engraving machine enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

820 A.C.P., Passara-Following is a list of die makers and engravers:—A. B. Sinha & Co., 14, Upper Chitpore Road; Dass Brothers, 14, Garanhata Street, and Art Emporium, 9, Brindaban Basak Street; all of Calcutta.

821 A.C., Kanpur-Vide No. 820 above. 822 A.K., Sharakpur-For glass ware en-quire of the following firms:—Balsukh Glass Works, 7. Swallow Lane; Bengal Glass Factory, 106, Khengrapatty Street; Burma Glass Works, 9, Ezra Street; Calcutta Glass & Silicate Works, 9, Kundu Lane and Victoria Glass Works, 130, Mechuabazar Street; all of Calcutta.

823 U.C.C., Kanpur. Pin and clip making machines may be had of Baird Machinery Co., Bridgeport, Connecticut, U. S. A.

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880 M.D.C.C, Calcutta—For transfer labels enquire of Signograph Co., Baranagar, Calcutta and R. G. Pal & Co., 110/2, Grey Street, Calcutta.

831 A.C.B., Jodhpur—Process of manufacturing rubber baloons will be found in Manufacture of Rubber Goods published from this office, Rs 3/9/- including postage. Process of manufacturing naphthalene balls will be found in Manufacture of Disinfectants and Antiseptics published from this office, price Rs. 3/9/- including postage.

833 T.S., Nandyal—We are not aware of synthetic preparation of menthol.

838 S.K.M., Bombay—Your query regarding cuttings should be advertised in newspapers Addresses of translators and commercial magazines in different vernacular languages are not available.

840 D.G., Delhi—Machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; Martin Burn Ltd.. 12, Mission Row; Francis Klein & Co. Ltd., 1, Royal Exchange Place; T. E. Thomson & Co. Ltd., 9A, Esplanade East; and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; all of Calcutta.

841 B.P.S., Morena—Til oil to be refined is heated with 2 to 5 per cent. of animal charcoal in a vessel over a water bath. This is to ensure that the temperature of the oil is likely to get charred. The whole mass is stirred from time to time so that oil comes in touch with fresh surface of charcoal. The heating is continued for about an hour when the oil is refined. It is then strained through a cloth. You may use sandal oil and musk as fixative agent.

843 B.S., Jarai Kela—Process of manufacturing caustic soda from sodium chlorida will be found in Chemical Industries of India published from this office, price Rs. 3/9/including postage.

844 P.K.A., Trichinopoly — For zine and tin ingots enquire of the following firms: Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; B. K. Mookherjee & Sons, 70, Netaji Subhas Road and Standard Metal Co., 101, Netaji Subhas Road; all of Calcutta.

852 L.N.D., Jabalpur--All the machineries you require may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and T. E. Thomson & Co. Ltd., 9A, Esplanade East, Calcutta.

853 J.S.B., Poona — You perhaps mean electrolytic paste which consists of flour, plaster of paris, salammoniae and zine chloride with enough water to make a paste. Following is a formula of hair cream: White beeswax 10

parts; parafin oil 130 parts; distilled water to parts; borax 1 part; perfume 3 parts. Metali wax in 50 parts of parafin oil. Place in mortar and stir in the remainder of the bar parafin. Add the distilled water in white borax has been dissolved and stir the formed consistently until cold. Collability tubes may be had of Metal Box Co. of Ltd., B2, Hide Road, Kidderpur, Cancollapsible tube filling machine may be for Road, Calcutta. Lanoline may be had butto Kristo Paul & Co. Ltd., 1 & 3. Butane, Calcutta. Bentonite may be had all Lane, Calcutta. Bentonite may be had calcutta Mineral Supply Co. Ltd., 31, Juliane, Calcutta. Agar agar may be had banshidhar Dutt, 126, Khengrapatty Scalcutta.

till and coconut oil to be used as hair α_1 be found in Indian Perfumes, Essence Hair Oils published from this office, Rs. 3/9/- including postage.

859 D.D.A., Andheri — Process of parties to glice will be found in December 1 issue of industry.

issue of Industry.
861 M.A.A., Bhongir—A formula of cream will be found in June, 1950 issue a Industry.

862 D. B., Lushai Hills—For enal anamelplates engire of the following firm. Enamel & Stamping Works, Ltd., 9, Middle Entally, Calcutta and Bengal Enamel W Palta, 24 Parganas.

863 R.P.V., Banaras — For drug 1 you may write to the Director, Central 1.3 Laboratory, Govt. of India, 110, Chitta: Avenue, Calcutta.

864 J.N., Puri—Palm oil is not ext. from palm or tal fruits. Palm oil is availed North and South Africa and in some parameter.

865 K.T.C., Morvi City.—Agarbati, manufactured by the following firms: K. Gupta Agarbatti Factory, 6, Apparao Dhoop Factory, Kalamma Temple Mysore; Mysore Shah Agarbatti Factory Mysore Shah Agarbatti Factory Mysore Shah Agarbatti Factory Mysore Shah Agarbatti Factory Mysore Satyanarayana Parimal Factory Mysore Satyanarayana Parimal Factory Mysore Mys

866 U.P.T., Moulmeingyun — Procemanufacturing mosquito repelling pesurti zarda, phenyle, etc. will appear is course.

WIDE - WORLD

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867 U.C.C., Kanpur-Process of manufactiring water colour cakes will be found in May, 651, issue of Industry. Following is a formula if scaling wax: Shellac 14 parts; Rosin 24 Viiting 4 parts; Turpentine 4 parts. Melt the value and rosin over a slow fire, keep hot and k in the pigments. Lastly add the turpenoil. Cast into sticks. For mould enquire mall Machineries Mfg. Co., 22, R. G. Kar Calcutta.

Kanjirapally-There is no 868 K.S.J., agement for giving practical training in affaceure of carbon paper. You cannot infacture brushes with the brittle vegetable 11. S. Sealing wax making mould may be had small Machineries Mfg Co., 22, R. G. Kar ∍l, Calcutta.

\69 V.H.P., Kolhapur-Match making lines may be had of Standard Machinery 86B, Netaji Subhas Road, Calcutta.

871 H. L. J., Delhi-Process of manufacturblack salt appeared in August, 1951 issue andustry.

873 D.R.T., Bombay -- We are not aware of such chemical that will prevent charring of ti" buttons when ironing

876 K. M. S., Peshawar - Process rerising cotton appeared in June, 1951 issue

877 S.M.E., Gudibanda — Date seeds are used in coffee manufacture.

578 S.S.R R.C., Pallatur — Process of infacturing sago appeared in June, 1949 of Industry. For machines enquire of ental Machinery Supplying Agency Ltd., Mission Row Extension, Calcuita and strial Machineries & Tool Mfg. Co., 41, whanantola Road, Howrah. Starch is used aw material for manufaceturing sago.

879 W.S.C., Karachi-Strawboard may be : of Bharat Straw-board Co., 55, Alli Cham-Tamarind Lane, Fort, Bombay; and Straw d Mfg, Co., Saharanpur. For panel pins core of Utility Products Ltd., 14, Bentinck . . . Calcutta,

881 D.S.R., Bapatla—Brick and tile makmachines and other machines you require be had of Martin Burn Ltd., 12, Mission · Calcutta.

882 K.K,D,C., Belgaum Refer your query o Director, Imperial Veterinary Research mute, Mukteswar, Kumaun, Nainital. For ok on chemical industries enquire of (Ker Spink & Co. (1933) Ltd., 3, Esplanade Calcutta.

583 Q.C.W., Ahmedabad-A good formula lesizing agent will appear in due course.

884 S., Lucknow-Process of bluing iron manufacturing lice killer and making ink will appear in due course,

885 A.P.J., Rohtak-For cigarette making machine enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Cotton spinning machine may be had of W. H. Brady & Co. Ltd., Mercantile Bidg., Lall Bazar, Calcutta. For safety pin making machine write to Baird Machinery Co., Bridgeport, Connecticut, U.S.A.

887 S.V., Kanpur-Process of nickel plating and chromium plating will be found in Electroplating in Practice published from this office, price Rs. 3/9/- including postage. Process of manufacturing cycle saddle cover

will appear in due course

889 B.N.S., Lucknow—For celluloid sheets enquire of A. K. Zalnuddin & Co., 122, Bhindi Bazar, Mohamadi Manzil, Bombay 3 and Swadeshi Industries Ltd., 100, Netaji Subhas Road, Calcutta. For mould enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta 1, Acetone may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcuta.

891 B.B.R., Darrang--Following is a list of hardware dealers. B. C. Kumar & Bros., 42, Strand Road; B. K. Mookherjee & Sons, 70, Netaji Subhas Road; B. Roy Bros., 113, Manchar Das Chowk and Bombay Hardware Mart, 82, Netaji Subhas Road; all of Calcutta 892 T.S., Patiala Creosote oil may be had

of Balmer Lawrie & Co. Ltd., 103, Netali Subbas Road and Turner Morrison & Co. Ltd.,

6, Lyons Range, both of Calcutta. 893 S.L.G., Farcukhabad—You may start a chemist's shop. But before starting the shop you should obtain some experience in the line You may approach manager of a big chemist's shop to be an apprentice to learn the secret of the business.

895 N.D., Srimangal - Lozenge making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Following is a list of lozenge manufacturers: B. C. Datta, 71, Canning Street; C. & E. Morton (India) Ltd., 8. Royal Exchange Place; Empire Confectionery Co., 157, A. Dharamtala Street: James Lord & Sons Ltd., 5, Commercial Bidgs, and U. P. Conrectionery, 71/1, Canning Street; all of Calcutta.

897 M.S.B., Chikmagalur-For iron mortar and pestle enquire of the following firms: New India Hardware Mart, 152, Narayan Dhuru Street, Bombay 3; Shah & Brothers, 234, Nagdevi Street, Bombay and Lachmi Hardware Stores, 113, Manohar Das Chowk, Calcutta.

898 (I.K., Ranchi-You may take agency of Bengal Chemical & Pharmaceutical Works Ltd., 161, Manicktala Main Road: Calcutta Chemical Co. Ltd., Panditya Road and Bengal Immunity Co. Ltd., 153, Dharamtala Street; all of Calcutta.

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-REVIEW OF BOOK!

THE THEORY AND PRACTICE OF INDUSTRIAL RESEARCH by David Bendel Hertz, Ph.D., Professor of Industrial Engineering, Columbia University. Published by Mc Graw Hill Book Company, Inc., New York. Pages 385, price \$ 5.50.

The advantages of industrial research are now widely recognised all over the industrialised countries of the world and there is hardly a big industrial organisation without a department for conducting research work. Practically a company which wants to keep up leader-ship in competition with its rivals has got to keep its vigilant eyes on the improvement of its products and processes, and introductions of new ones in the market. New inventions and processes in the domain of pure science are daily coming to light and the possibility of their application to the particular industries is to be worked out carefully. Moreover independent research work is to be always kept in view to further improve the standard of production and to introduce new lines of manufactures. The book under review discusses in a comprehensive way the fundamental basis of research work, both in its theoretical and practical aspects. Although research work is now-a-days being undertaken on a wider scale in India than formerly and National Laboratories have been set up for scientific investigations and enquiries in various lines, literature about the theoretical and practical aspects of this subject is rather scarce. The book throws a flood of light on this subject and as such should be widely read for deriving the best benefit from the research projects and programmes.

The book commences with a brief and intelligent account of scientific investigations from the days of Artistotle and Plato down to the period of Pascal and Laplace and traces the gradual evolution of reasoning processes and development of research methods which form the tools in the hands of modern researchers. The book then proceeds with the magnitude of research in industrial fields like chemicals, dyes, textiles etc. and evaluates the benefits accruing from it to the society.

The special feature of the book is however scientific discussions of the various aspects which are to be taken into account when a particular research work is contemplated. The first step in the scheme is an analysis of the research processes which combines creative mentalities, problems, methods and solution with a view to attaining a rational methodology for the enterprise to adopt. Complexities of the problems under research, the offshoots of the problems, the availability of the raw materials required for the purpose, the selection of a particular method are to be given first consideration. The other factors which are to be considered are the cost of each alternative processes in hand in terms of the final madufacturing cost, amount of capital which may be . available from the company's surplus or from

other sources to utilise the results of 11 research work, the total cost of research vin etc., etc. Another question is whether research personnel is competent to cari the work in a satisfactory manner. In connection investigations are equally necessic for research work regarding perfection in ... existing processes and it becomes necessacollect market data of sufficient accuracy. and market trends with a view to evalue; the proposal. It is needless to say that read ... work should be reserved for only such process. as have the chances of highest potential re-In concluding chapters of the book there a full discussions for the facilities that will ;... a research worker in solving the prodelegated to him. A general outline has begiven of the policy to be followed by a core of as regards safeguarding its interests by paring and agreements. Finally the importance keeping up relationships with sister organic. tions and co-ordination of work has been stressed. We recommend the book highly ' the notice of all interested in research work.

THE INSURANCE DIRECTORY, 195 Edited by Ashutosh Banerjea, Editor, Insu ance Heraid. Published by Chhaya Publisher Ltd., 2/1, Mission Row, Calcutta. Pages 261 price Rs. 3/8/--

The present volume, like its predect of contains a mass of valuable information on the progress of insurance in India. The feature of the book is a comprehensive account shown the position of the various insurance compared the position of the various insurance compared operating in India along with their schedule operating in India along with their schedule operating in India along with their schedule operating in India, summary of revenue account distribution of assets, summary of valuation report, etc., etc. Besides this the book contains in India with years of registration, a hard actuaries in India, and other interesting taken An important addition to the book is a finclusion of the more important sections of the more important sections.

TRADE ENQUIRIES

(To communicate with any party write thim direct with name and address given being mentioning Industry.)

688 Garsan Commercial Corporate Sanyogitaganj, Nudore—Wants to know the newspaper of Goa.

Ganj, Bhopal—Wants to be put in touch natural magnet stone suppliers of Pagadad, Medina, Mecca, Aden, Iran Gwalior State.

845 S. M. Sharif, Idrees Gauj, Harris Wants to be put in touch with the supplier dried gut, beef and sheep casings and 1 interested in sinewgut.

986 J. N. Parikh, 3, Mangoe Land Calcutta 1—Wants to be put in touch with the suppliers of raw bristles, crushed bones, ind fleshings and electroplating brushes.

-IN THE FIELD OF INVENTION

SAPETY CLOTHING

Special clothing which protects workers at inst injurious chemicals has been developed to be Standard Safety Equipment Coy., Chicago, clothing coated with a Goodrich Company luct called yeon resin, is said to hold off the in of inorganic acids, alkalis, salts, hydrolons, amines and strong oxidising agents a chough for the worker to wash and change.

RECLAIMING ALUMINIUM FROM SCRAP

A mercury extraction process for reclama-

Normal smelting processes only remove contential impurities or coarse metallic mixics such as lumps of iron from the aluminium of material. Hot mercury acts as a selective rent for aluminium in typical alloys. The solutive increases with temperature and a value table for techineal purposes is reached only over the normal b.p. of mercury, thus, requiration that the use of pressure vessels.

Intermittent extraction in autoclaves was : : satisfactory. In the continuous process, an epon hot cold U-tube having a central horizonto hot section and two cold vertical tubes is bloved. The height of the cold tubes is suffiand to balance the mercury vapour pressure the hot section. The top portions of the verteal columns are kept at room temperature to mimize vapour losses. Wetted crude alumirum passes in counter-current to the mercury. the concentration being properly adjusted durextraction. After solution of the alumiun and mechanical separation from the reinc, the mercury passes into a cold zone of the Papparatus where it crystallizes out on surface as a silver-white magma. This is seemmed off and pressed to a cake with 70 per out, of the metal. The remaining mercury is proved by melting at 750°C, out of contact th air. The extraction residue is similarly thated to recover the mercury.

The process may be used for the production primary aluminium-silicon alloy produced by betro-thermal smelting of bauxite and coke, wided the coke alloy is produced in larger selting units of 20,000 to 30,000 kw. to make economic.

-- INDUSTRIAL CHEMIST.

BLEACHING OF JUTE FIBRE

The rate of bleaching of lignocellulosic aterials with chlorine is greatly reduced by sucking the free phenolic or enolic hydroxyloup in the lignin by a methoxylgroup. Paral acetylation of jute with a mixture of acetic hydride and pyridine as well as methylation if the an ethereal solution of diazomethane has ow been shown to similarly retard the rate of bleaching (Nature, 1950, 166, 1940). The acetated sample required seven chlorination and

sulphite extractions (by the Cross and Bevan method) for isolation of a ligninfree fraction as against three such treatments in the case of raw jute. The colour reactions associated with lignin after chlorination in acid solution and addition of sodium sulphite were much less marked with the acetylated sample. While the non-acetylated material developed an intense red colour in the cold immediately on adding sodium sulphite to the chlorinated lignin the acetylated material had to be warmed and even boiled before any colour developed. Exposure to light, of the partially acetylated jute, resulted in photo-chemical bleaching and loss of acetyl groups from the sample while the raw jute turned yellow or brown. There was no change in the bleaching rates and colour reactions of acetylated jute before and after exposure to the light of a mercury vapour lamp indicating that the acetyl groups removed during irradiation are not those responsible for retarding the bleaching reactions of acetylated jute.

NEOPRENE AIRDRY COATING

Neoprene, the synthetic rubber made by Du Pont, Washington, can now be applied as an airdry protective coating for industrial maintenance work on structural steel, concrete, wood and exterior surfaces of tanks, and equipment. It is applied by brush or spray gun in a single coat. Outstanding properties are those which distinguish neopcene from natural and other synthetic rubbers exceptional resistance to oil. grease and chemicals; and resistance to agecracking by sunlight, weather and ozone. It also possesses the characteristic properties of any rubber product resilience, elasticity, a high order of abrasion-resistance, and noncracking properties. The new material has now ' been named Gaco Neoprene Maintenance Coating. An outstanding feature of the air-dry coating is the fact that it develops its desirable physical properties without the benefit of heat.

-- CHEMICAL AGE.

MOISTURE METER FOR TEXTILES

A new British instrument for measuring the moisture content of textiles is based on the fact that a static electric charge develops on warps and cloths of fibrous materials during drying and movement. The magnitude of this charge is related to the moisture content and is independent of the grade and thickness of the cloth.

The electric charge is collected from the full width of the material by means of an electrode which is mounted at the delivery end of the drying machine, the potential being conveyed to a measuring instrument and converted to an indication of the moisture content, and shown by meter and signal lights. Semi or fully automatic control of drying can be operated from this instrument.

-Indian & Eastern Engineer.

-FORMULAS, PROCESSES & ANSWERS

PRINTING ON WOOD

In printing wood special consideration must be taken, because the surface of wood is so absorbent, that a priming coat must always be applied to prevent the ink from soaking it too much. The surface, after being smoothed, is sponged with a mixture of ammonium hydroxylamine hydrochloride, and then with hot water. In case the wood does not absorb water readily, 10 per cent. of glycerin may be added to the hot water.

An alternative procedure involves the use of a coating preparation consisting of a solution of 50 parts of rubber, 30 parts of white wax and 60 parts of Canada balsam in 700 parts of turpentire, 40 parts of linseed oil, and 650 parts parts of benzene. Afterwards the wood may be printed with a fatty ink and subsequently coated with a varnish or lacquer for protection against mechanical and chemical deterioration.

DEPILATORY CREAM

396 J.D.S.K., Palm-Wants to have a recipe of depilatory cream and also hair cream.

Barium sulphide	30	grms.
Atropine	5	
Spermaceti	100	
Distilled water	200	
White petrolatum	300	23

Melt over a water bath and mix and put in pots.

This cream can be used as depilatory or can be applied every day for 20 minutes to stop the growth of unwanted hair.

HAIR CREAM

White becswax	10	parts.
Parailin oil	130	49
Distilled water	15	**
Borax	1	part.
Porfuma	3	parts.

Melt the wax in 50 parts of parailn oil. Place in a mortar and stir in the remainder of the liquid parailn. Add the distilled water in which the borax has been dissolved and stir the cream formed consistently until cold.

GREASE CRAYONS FOR WRITING ON GLASS

537 R.K.G., Dhampur—Wants to have a formula of grease crayons for writing on glass and also glass paint.

White beeswax	40	parts.
Tallow	44	90
Carmine	45	9.0

Melt the tallow and add the wax in the form of fine flakes. When the wax is also melted, stir in the carmine and keep stirring until the mass has almost solidified. Then pour it into small waxed paper tubes.

INE FOR WRITING ON GLASS

Pale shellac	2 02.
Venice turpentine	1
Sandarac	ł "
Oil of turpentine	3 fl.6.

Dissolve by gently heating and then it oz. of any one of the following pigments:

Black	Lamp-bla	ick.
Blue	Ultrama	rine,
Green	Brunswi	ck Green.
Red	Vermilli	on.

PAINTING GLASS

Thoroughly clean inside of glass and as a first coat of a very thin mixture of white is and turpentine, containing a pint of hard-distantial per gallon of turpentine spread rape on glass with a soft brush and immediate stipple the paint with a wall stippler.

SNOW

548 H.C.F., Bihar Sharif—Desires to keep a good formula of snow.

Stearic acid	24	lbs.
Pot, carbonate	5	9.0
Glycerin	. 8	n
Water	12	gal

Perfume with rose, jasmine or composiseent.

Heat the glycerin, pot, carbonate and wartogether to 200°F, and add stearic acid (), viously heated to 200°F.) to it slowly with ring in an emulsifier or whipper. Contact stirring until the mass is homogeneous. At to stand overnight. Next add the perfume mix for 20 minutes. This cream is softer the old-fashioned creams but typifies the higher grade modern vanishing cream. The pea ness in this cream increases with age and helped by stirring cold the next day.

NAPHTHALENE BALLS

563 A.C.B., Jodhpur-Wishes to have a process of making paphthalene balls.

In order to produce naphthalene balls 1.
purified naphthalene is carefully melted at low heat in an ordinary melting pot and last into the moulds with an iron ladle. Great can must be taken in melting the substance becausing a great loss to manufacturers, casting, iron and wooden mould are generated. These are made in two halves connecting there with pins; in each half a number hemispherical depressions are sunk in a lowith a tube connecting them all together, one end of the mould is a hole drilled for poing in the melted mass. On cooling, the last is solidified into balls, which may be separated by breaking off the attached pipe.

UBBER BALLOONS

Rubber latex 60%
Colloidal sulphur
paste 50 p.c.
Zinc oxide
Piperidine piperidine-1carbothionolate (accelerator)

The order of addition of the ingredients is portant, since many compounding ingredicoagulate latex unless preciously dispersed wetted in water or other emulsifying liquidabove mixings contain very little solid terial and is easily prepared by weighing out accelerator and sinc oxide, moistening these hater or dilute ammonia solution, and ing up with the sulphur paste. This mixeless is ground to a smooth cream in a mortar added to the latex with constant stirring uniformly dispersed.

Having prepared a suitable vulcanisable v, this may be utilised for dipping. The ners e.g. glazed porcelain, glass, varnished I wood, be fitted in a frame are immersed the latex bath fairly but the rate of withwal must be slow and uniform. The forms after withdrawal are inverted and allowed try somewhat, and then the necks of the baliss are rolled up to form collars. The rack a passes to the hot air vulcanisers. The perature of the air and the time of drying a simultaneous vulcanisation are adjusted the capabilities of the accelerator used in mixing.

The final operation in the production of eped goods is that of stripping in which the tele is peeled off the former on which it has a made.

Fresh unvulcanised or imperfectly vulcanislatex rubber will stock to itself very strongs that the surfaces can only be separated the great difficulty. Even fully cared surfaces latex rubber show an inconveniently strong action if pressed into contact; consequently to kind of surface treatment must accomply the stripping of the dipped goods from a formers to prevent the film from rolling the sticking into wrinkles. Commonly, a call dusting is given with French chalk. It been noticed that where a calcium chloride sulant has been used, fully vulcanised goods he stripped successfully merely by works.

be stripped successfully merely by worka little water between the film and the her. Where perfect transparency is to be mained articles-may be stripped under hot by water and dried without rinsing.

PPERMINT TABLETS

587 N.A.K., -Desires to have a good forla of making peppermint tablets.

Fine sugar	92	lbs.
Starch	4	6 oz.
Powdered gum tragacanth	8	0Z.
Gum solution	120	fl. oz.
Peppermint oil	8	
Medicinal liquid paraffin	2	11 11
Talc	3	lbs. 2 oz.

The gum solution which is used as a moistening agent is made up by dissolving 1 lb. 4 oz. powdered gum acacia in 120 fl. oz. of water.

Now mix the sugar, starch and gum tragacanth. Next moisten the mixture with the gum solution. When base is thoroughly moist pass through No. 8 mesh screen on Oscillating Granulator. Spread the wet granules out to dry. When dried sleve again through No. 12 mesh. Transfer the received dry granules to a mixer and add the peppermint oil, liquid parafin and talc while the mixer is running. The granules will be ready for compressing after about 10 minutes run.

RECOVERY OF SILVER FROM WASTE FILMS

619 B.S.T., Hoshiarpur—Desires to know a method of recovering silver from waste films.

To reclaim silver place the old films, plates, paper, etc., in a porcelain dish, so arranged that they will burn readily. To facilitate combustion, a little kerosene or denatured alcohol poured over the contents will be found serviceable.

Before blowing off the burnt paper, place the residue in an agateware dish, the bottom and heat it until the silver is separated as a peter and water. Place the whole on the fire, of which is covered with a solution of salt nitrate.

The solution being complete, add to the mass a little water and hydrochloric acid, when in a short time the serviceable silver chloride will be obtained. If the films should not give up their silver as freely as the plates, then add a little more hydrochloric acid or work them up separately. Silver reclaimed in this way is eminently sultable for silverplating all sorts of objects.

ENGRAVERS' VARNISHES

In copper plate engraving the plate must be covered with a dark-coloured coating which, through entirely unaffected by the etching fluid, must be soft enough to allow the finest ines to be drawn with the needle and must also be susceptible of complete and easy removal when the etching is finished. Varnishes which possess these properties are called "etching grounds". They are made according to various formulas, but in all cases the principal ingredient is asphalt, of which only the best natural varieties are suitable for this purposes. Another common ingredient is beeswax, or tallow.

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Etching grounds are usually made in small quantities, at a single operation, by melting and stirring the solid ingredients together and allowing the mass to cool in thin sheets, which are then dissolved in oil of turpentine. The plate is coated uniformly with this varnish through which the engraver's tool readily penetrates, lying bare the metal beneath. After the lines drawn have been etched by immersing the plate in acid, the varnish is washed off with oil of turpentine.

The following formulas for etching grounds have been extensively used by engravers:-

		I. Parts	II. Parts	III. Parts	IV. Parts
Yellow wax		50	30	110	40
Syrian asphalt	_	20	20	25	40
Rosin					20
Amber				20	
Mastic		25	25	25	
Tallow	. .				2
Bergundy pitch					10

ALUMINIUM FLUORIDE

625 S.D., Calcutta -- Wants to know a process of preparing aluminium fluoride.

A solution of aluminium fluoride is most conveniently prepared by suspending 42 grms. of basic aluminium acetate and 54 grms, of alumina in about 100 c.c. of water and 66 grms. of 40 per cent, hydrofluoric acid. Solution occurs either at once or after boiling for a short time. The solution gradually deposit a gelatinous or colloidal hydrate of aluminium fluoride. The same dilute solution gradually deposits a crystalline crust of a similar composition.

AMMONIUM BICARBONATE

Ammonium bicarbonate may be prepared by treating an aqueous solution of the commercial carbonate with carbon dioxide gas. It is also obtained by adding alcohol to an aqueous solution of the commercial carbonate.

COFFEE TABLETS

650 M.S., Nagarett -Wishes to have a formula of making coffee tablets.

Take roasted coffee and grind it to coarse powder by means of a gringing machine. Then mix chicory powder in the proportion of 2 parts of chicory in every 8 parts of coffee or according to the taste of manufacturer. Then put the mixture in an automatic pressing machine and press into tablets. The size and shape of the

🖪 tottel karden bedreiter bet liedet in tre bessessieter in bessessieter bestrick bestrick bestrick for properties 🛱 STANDARD CHEMICAL PHARMACEUTICAL WORKS

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tablets vary with the manufacturer. Some tablet manufacturers do not add any bin . material, but others add about 15 per glucose.

BRILLIANTINE

693 P.R., Calicut-Wants to have recupbrilliantine.

White soft paraffin	900	part
White ceresine	100	
Bergamot	2	
Iorone alpha	4	,
Violet absolute	1	part,
Heliotropin	2	part -
Vetivert oil	1	part

Melt the soft paraffin and ceresine a water bath and incorporate the other has ents one by one. Then remove from the so, of heat and run into pots.

INK TABLETS

740 G.U.C., G.T., Madras - Wants to ' recipes of ink tablets, candle making, etc.

In making ink tablets take the folio composition in a mortar and moisten it was little water as possible. Do not add too : water which will take a long time to dry. put this moist lump over a tray and expoto dry in the sun for three or four 1 When dry break the lump into coarse pso as to form granules like mustard. compress into tablets in a tablet makin: chine.

Methylene blue	8 07
Methyl violet	2
Sugar powdered	2
Dextrin	1
Rovie acid	9 4.

CANDLE MAKING

Hard paratlin	30 - 07
Stearic acid	17)
Beeswax	2]

Melt together and stir until cleacoloured candles are desired a pinch of a soluble dye is dissolved at this stage. Por vertical moulds in which wicks are hur-

PAPAIN

"54 K.C.I., Khagarla-Wants to hat . good process of preparing papain.

The best method to prepare papam collect the juice of unripe papaw by no shallow longitudinal incisions about 4 inch in the well grown fruits, by means of a metallic knife such as a bone or ebonite k

Fruits in which only three to four sions are made simultaneously can be 10 again after a day or two. The juice reset a white thin sticky latex which coag 1000 rapidly.

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Toilet creams, cold creams, vanishing creams, complexion creams, toilet powders, pomade, toilet water, toilet lotions, shampoos, rouge, lipsticks, cycbrow pencil, hair restores, shaving creams, after-shave lotions etc.

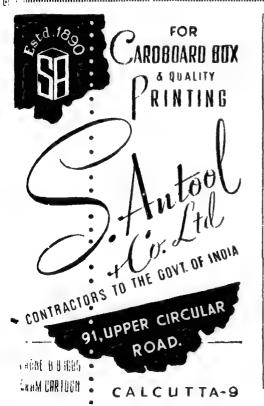
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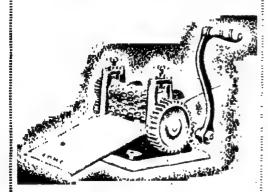


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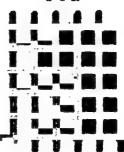


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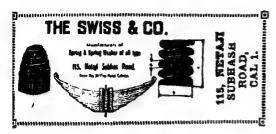
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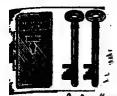
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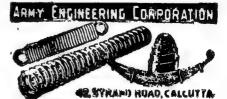
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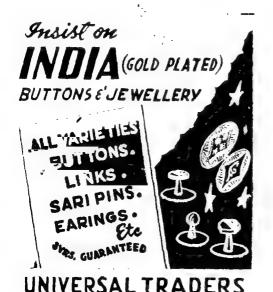


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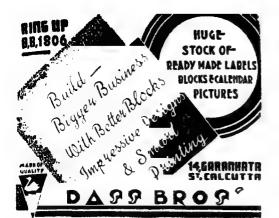
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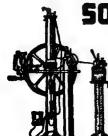
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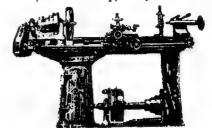
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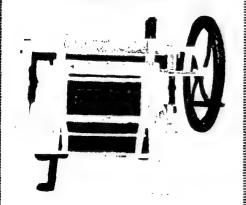
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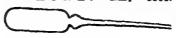
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STATE ENTERPRISE

As years roll on new and difficult responsibilities are being more and more thrust upon the Government, and in coming years Government's functions in the economic sphere are likely to expand. Besides the defence industries which must continue to be run as an integral part of the Governmental machinery on grounds of secrecy, the management of certain key industries which will serve as the starting point of very many small industries will have to be taken up by the Government.

But there is considerable misgiving about the prospects of State enterprise in the public mind. There are many responsible men who, strongly believe that the State-managed concerns cannot function as efficiently and profitably as the private concerns. This is so because men who will be commissioned to run the State enterprise have worked all through their life in official capacity and cannot be expected to possess the keen business sense and quick judgment of an Indian merchant long in the business line.

In this event it is necessary to make a critical examination of the conditions which alone can make the State enterprises successful in the strictest sense of the term. This formed a subject of enquiry by Mr. A. D. Gorwalla who has recently submitted his Report to the Planning Commission.

Mr. Gorwalla in his Report admits that private enterprise has certain special advantages over public concerns but thinks that the handicaps to which State enterprise is subject to can be successfully surmounted in process of time by better recruitment, better training and better methods.

In his Report Mr. Gorwalla attempts to devise means for economy in production and quality control of the goods and services in respect of each and every unit under Government management. He lays great emphasis on the selection of proper personnel for the internal management of the unit. Over and above this, he says, modern technique must be adopted and new traditions built up which will combine the best in Governmental and private enterprise.

(Continued on page 206)

-CURRENT TOPICS

EN-YEAR AGRICULTURAL PLAN

1

While the food position of the country ince partition of India is causing a good eal of headache to the Government in ower, our thoughts turn back to the big eports eulogising activities of the various Agricultural Departments and their chievements towards speeding up agriultural production. We have been told f the improved strains of rice and wheat volved in the laboratory, that would solve he food problem. But as matters stand tere is a wide gap between the laboratory nd the field which should be bridged nmediately for the benefit of the country. 'here is a growing consciousness on this oint in Government circle. What is the ood of evolving high-yielding and diseaseesistant seeds, if the researches remain losed in office files. A ten year scheme is nder contemplation that will altogether ansform the agricultural economy f the country and will engender an nthusiasm among the peasant class for ne introduction of better seeds and exension of cultivation. · Concrete targets be achieved for this programme of land ansformation in the next ten years are:

Concentration of efforts on 48 million acres of irrigated land, reclamation of 10 million acres of land for new cultivates provision of 60,000 stud bulls a year organisation of Land Army in a lakh of villages and addition of 30 crore trees. In several states some villages have alread been taking to collective village organisation. This passing enthusiasm should be harnessed into a disciplined and organisation, if the scheme is to be put on a sound basis.

FIVE-YEAR PLAN

The draft outline of a five-year plan by the Planning Commission envisages on outlay of Rs. 1.793 crores on development programmes. The Plan is divided into two parts. The principal emphasis in the Plan is on agriculture and irrigation. This is explained by the serious view which the Commission takes of the country's food problem. If the per capita availability is to be raised to 14, 15 or 16 oz. per adult, the additional production required would be 8.2, 12 and 15.8 million tons, repectively. These figures indicate the

(Continued from page 205)

There is another outstanding point on which Mr. Gorwalla lays special emphasis. He thinks that although the management of the State enterprise will be answerable to the Parliament and Ministry concerned, there should be machinery for allowing organisations to run without too much interference from those quarters. Mr. Gorwalla suggests that the Parliament should be afforded every opportunity to discuss the working of the concerns when the annual accounts and reports are presented before the Parliament and that there should be checks in the shape of Consumer's Councils and Price Tribunals to enable judgment being passed on the success or failure of State enterprise. There should also be a proper system of cost accounts and of quality control and maintenance of commercial accounts which should be periodically audited by the Auditor General.

mignitude of the task that lies ahead and of the effort which is called for.

The first of the Five-Year Plan conemplates expenditure of Rs. 451 crores on regation and power schemes. The total et of projects included in this part of Plan is Rs. 729 crores of which Rs. 138 crores have already been spent. the projects are calculated to irrigate an additional area of 8.7 million acres by 1956 and to provide additional power amountng to 1.1 million kilowatts. This will increase the irrigated area of the country w 20 per cent, and the power potential w 70 per cent. over existing capacity. In completion, the projects are expected o irrigate an additional area of 16.5 collion acres and to increase the power totential by nearly two million kilowatts.

The programme of irrigation and lower development, the Commission sugjests, has to be viewed in terms of a major ong term objective. This should be over period of 15 to 20 years to double he area under irrigation and to secure adlitional production of power amounting o 7 million kilowatts. It is by utilisno available resources for irrigation and of power on this scale and by the adoption of intensive measures for improving the fundard of agricultural production and be promotion of cottage, small-scale and rue-scale industries with the help of heap electric power, that an appreciable ise in the standard of living can be chieved.

Reviewing the industrial development which has taken place in recent years, the lommission sets forth the following main tens for Five-Year Plan for industry:

1) Meeting the demands for industrial roducts on account of schemes for agricultural development; and expansion of existing capacity of producer goods industries like jute, and consumer goods industries like cotton, textiles, sugar and

soap; (3) Expanding the capacity of industries producing pig iron, steel, heavy chemicals, etc., which are of basic importance to the general economic development of the country; units on which a part of the capital expenditure has already been incurred; (4) Removing the lacunae and drawbacks in the existing industries,

A number of measures for the development of small-scale industries are suggested by the Commission, for instance, establishment of small-scale units at suitable locations for producing steel casting, evolution of small spinning machines for production of yarn and establishment of trading estates at selected centres where cheap power and transport facilities are available.

For the organisation of cottage industries, the Commission relies mainly on industrial co-operatives and on non-official organisations engaged in constructive work in the field of cottage industries to be developed. A programme for rural cottage industries has to aim primarily at assisting the artisan to remove the deficiencies, e.g. lack of organisation, local demand, efficient methods, material and finance and at additional measures such as appropriate stores purchase policies.

LIME-STONE DEPOSITS IN RAJASTHAN

Rich deposits of limestone, covering an area of nearly 25 square miles have been discovered at Chittore in Rajasthan. I. is estimated that the quarries will yield sufficient quantities of limestone to enable the installation of a plant at the site for the production of 1,000 tons of portland cement a day. At present this limestone is being used for the manufacture of paving and flooring stones.

U. S. ECONOMIC AID TO INDIA

New details are now available: of America's programme, of economic aid to

South-East Asian countries in the coming year. The programme, costing 80 million dollars, provides for assistance to India, Pakistan, Afghanistan, Ceylon and Nepal in the following manner:—

India: Extension and improvement of agricultural production by the reclamation of unused land, by use of better seed, implements and farming techniques, building of fertilizer plants, and the sinking of tubewells. American assistance in a fisheries project and geological survey work also was contemplated.

Pakistan: Improvement of agricultural techniques by the introduction of American extension method, improved implements and greater use of fertilizer. Assistance also was contemplated in reclaiming land, introducing modern road-building methods, opening new trade schools and in carrying out a geological survey.

Afghanistan: Assistance in supporting a number of economic development programmes already introduced by the Afghanistan Government, in distributing coal to the Kabul area.

Ceylon: Expert assistance in Ceylon's own programmes for agricultural extensions, water resources survey and the production of educational and training films.

Nepal: Technical advice for raising the low agricultural yield and to survey Nepal's mineral resources.

ROAD DEVELOPMENT IN WEST BENGAL

It appears the West Bengal Government has made good progress in road development within the past three years in face of grave difficulties. According to a representative of the Statesman (Calcutta) who had a talk with the Government official on this matter it appears that 1,500 miles of road are now under construction in the 14 districts of the State. Of the 19

bridges totalling 5,440 running feet, the construction of which was taken up since 1949, two have already been opened to traffic. They are over the Rambijhora in Darjeeling and the Jamuna at Gaigh ta (24-Parganas). A third bridge at Sat. mile on the Contai-Belda road in Midna. pore district is nearing completion. The wells and piers of the remaining 16 bridges have been constructed; their super. structures are expected to be completed next winter and all these bridges will be opened to traffic by June 1952. Plans for the construction of eight other bridges are under consideration. The total estimated cost of the 5 year programme is Rs. 26 crores.

Some idea of the colossal amount of earthwork which has had to be done doning the past three years may be had when it is realized that for one mile of road nearly 500,000 cub. ft. of earth are required Another handicap in the way of road making is the non-availability, at economic rates, of stone in all parts of West Bengal. To meet the shortage, roads have had to be constructed by laying 1 double soling of bricks with a layer of jhama (broken hard burnt bricks) over which a stone metal coat is laid to a depth of 3" to 4" according to the importance of the road. Over this formation a bitumen carpet is laid or a 4" concrete pavement is constructed. This method gave rise. to its own problem, namely, that of supplying bricks (roughly 600,000 to a mile). About 125 kilns were opened in several districts in 1949-50 and a similar number in 1950-51. The programme also included the provision of a large number of ferrice and the improvement of existing ones the numerous river crossings in the State where the erection of bridges would not prove economical. A considerable number of concrete culverts, small but neverther less tedious in construction, had also to be built.

MATERIAL RESOURCES

1 view of the extreme shortage of materials all the world over, a monwealth Ministers Conference will eld in London late in September to ss this problem. The meeting will der the problems of production and y of raw materials and of manufacgoods. Among the countries likely e represented are Britain, Canada, , Pakistan, Ceylon, Australia, New ind, South Africa and Southern esia. It appears that a suggestion been made that a permanent orgaion on a ministerial level be set up to der pooling and allocating strategic scarce materials. India, Pakistan and on which are collectively the largest monwealth producers of raw mateparticularly rubber, jute, cotton, janese, wool and hides and skins are suggestion. the sed f the view that in the interest of equiltrade and economic stability, the outof raw materials from their countries e rest of the Commonwealth should ilanced by an inflow of capital goods the more industrialized sister nations. so appear, that the London Conferagenda will cover short-term as as long-term supplies of raw matebut is likely to provide additional rtunity for closer Commonwealth eration.

LOPMENT OF AGRICULTURAL PLEMENT

'he Planning Commission recently had iltation with the representatives of Agricultural Implements industry and dered the future development of agriral implements and machinery to suit rowing needs of Indian agriculture.

was early suggested that a survey ld be undertaken to determine the of implements suited to different

soil conditions in the country. The survey team should consist of an agronomist, a soil physicist and agricultural engineers and a representative of the agriculturists.

Regarding the present difficulty about the manufacture of adequate quantities of indigenous and improved types of machinery, a suggestion was made that some steel processing industries might jointly sponsor the setting up of a blast-furnance plant.

It was revealed at the meeting that there are at present 231 factories engaged in the manufacture of improved types of implements with a rated capacity of 40,000 to 50,000 tons of steel consumption on single shift working. There are also eight organized units engaged in the manufacture of power-driven pumps with an annual installed capacity of about 33,000 pumps of varying sizes, and five units engaged in the manufacture of diesel engines with a capacity of 5,300 engines of different horse-power. The number of powerdriven pumps produced in 1950 amounted to 31,000 and that of diesel engines 4,600. In addition, certain firms imported agriculturn! tractors and implements while a few others manufactured tractor implements.

Statistics relating to imports of agricultural machinery and implements show that in the pre-war period, the average annual imports of agricultural machinery came to Rs. 100,00,000. After the war, there has been a steady increase in imports, amounting to Rs. 900.00.000 in 1948-49 and Rs. 16.5 crores in 1949-50.

Imports of diesel engines during 1949-50 formed 50 per cent of the value of total imports, while tractors and parts accounted for 31 per cent. It was estimated that during last year 4,000 to 5,000 tractors were imported and the demand was likely to increase from 10,000 to 15,000 tractors per annum during the next few years.

As for diesel engines, the requirements for irrigation purposes were estimated at 30,000 engines per annum, while the present capacity was stated to be 5.300 engines. In addition to plans for expansion of existing firms, four new firms have been allowed to set up plants for manufacturing diesel engines.

UTILISATION OF BAGASSE

(C)

Two important bye-products of the sugar industry are bagasse and molasses, which for the best interests of the industry require to be utilised properly. Chemically bagasse consists largely of cellulose and pentosans, both of which are elaborate compounds of sugars, and it is related to cereal straws, maize stalks, and other agricultural residues, industrially exploited in many countries. Bagasse itself is made into insulating material and hardboards for buildings in the U. K., the U. S. A. Hawaii, and Australia. In Barbados, it is mixed with lime and moulded into prefabricated "megacrete" units which are used for building house. Bagasse can also be utilised in the manufacture of cardboard and lining materials. These products make excellent packing containers and are in commercial production in America. And even paper of various types, can be made. both exclusively from bagasse and by mixing it with other pulps. Some promising small-scale results in this field were obtained in Formosa during the war years and, in 1950, the U.S. A. produced newsprint entirely from bagasse.

Further, its cellulose component, for instance, provides an "ennobled" substance, called alpha cellulose, which is the basic raw material of rayon, nitrocellulose, and if sufficiently pure, of cellulose acetate plastics. The sugar compounds of bagasse can be chemically split up to produce two "simple" sugars, dextrose.

and xylose. The former is easily fermer able to an alcohol, with numerous in portant industrial uses, while xylose c be converted into furfural, which can utilised extensively in the production oil, synthetic rubber, plastics, and nylo among others. One of the important as of bagasse plastics, for which plants being set up in the U.S.A., is in the man facture of laminates—special various made of materials bonde together by synthetic resins.

In this connection mention may be man of the fact that in the U.K., an import industry has been developed to ferment m lasses, which is another bye-product sugar industry, into acetone and butan-Other fermentation processes also vic such useful chemicals as citric, lactic, a aconitic acids. The aconitic acidy. possible starting material" for rubber and plastics manufacture, is no sent in sugarcane juice, and the econom processes for its recovery from mola-s have been developed in the U.S.A. Ed l yeast can also be produced directly he molasses. Molasses is also stated to ha considerable nutritional value, as they a tich in iron and calcium, and can l easily made to prepare a wide range "very attractive human foods."

TAMARIND SEED KERNEL PLOUR

Investigations carried out at the Indi-Jute Mills Association Research Institut Calcutta, have shown that tamarind see kernel flour can be used with advantafor the sizing of jute yarn and fabrics place of the usual starch sizing material It is estimated that some 66,000 ton this flour may be available and this quality would be abled to meet the torequirement of sizing material for jute of cotton industries. The studies show the material is quite satisfactory fuse in jute sizing.

-PROBLEMS IN STEEL ANALYSIS.

RECENT years have seen the solution to many of the difficulties encountered in the analysis of steel but a number of length tanding problems still exist. Some of the more important of these were described and the work being directed towards, their solution outlined by Mr. B. Bagshawe, of the Brown-Firth Research Liboratories, Sheffield, are summarised in this article for the benefit of chemists engaged in steel factories.

A practical solution is still awaited to the problem of operating the combustion sulphur process on a stoichiometric basis. Such a solution would be a most important development, as other sulphur determination methods are open to question. Methods based on hydrogen sulphide evolution are becoming more restricted in scope and use. Serious discrepancies arise on certain types of alloy steel, for example, copper and molybdenum steels, and the yield is also affected to some extent nature of the sulphur constituents in the metal, and the conditions of heat treatment.

The classical barium sulphate gravimetric procedure is open to error; in very low sulphur ranges, for instance, recovery a almost invariably incomplete. Various devices have been used to encourage maximum recovery, such as addition of known amounts of standard sulphate solution, but these have not been entirely successful. The process also suffers from inconsistency of blank values, which are often of comparable magnitude, to the amounts of sulphur being determined.

COMBUSTION PROCESS BEST

When much chromium is present the battum sulphate process is practically useless, due to the formation of complex throughout the training of the batter in a Complexion of

the chromium with acetic acid or other complexing reagents may help in this direction. Oxidation of chromium to chromate will precipitate insoluble barium chromate.

The combustion process and its properly regulated operation is really the key to the solution. Its many attractive: features include speed, convenience of manipulation, and above all, the lact that it may be applied to the widest range of steels and ferroalloys. If only the problem of the yield factor could be solved, then there is no doubt that, as far as steel is concerned, all other methods would be abandoned forthwith.

In the most recent form of combustion apparatus soda asbestos is replaced by a salica gel dryer. A rubber suction ball is also incorporated to permit the absorbent to be drawn up the delivery tube for rinsing purposes, giving an increased titre of 0.2-0.3 ml. Others developments include the use of enclosed 'cartridgetype boats, which permit a more concentrated reaction with less slag spatter.

MODERN IMPROVEMENTS

Elimination of all filters and plugs of cotton wool, asbestos, or glass wool, and the simplification of the delivery part of the system are important recent strends. These modifications are possible, since the carry-over of ferric oxide dust can be prevented by presintering the sample before admitting oxygen.

Sintering for periods of two to five minutes is most effective, and the ferric oxide dust is retained in the hot combustion zone, where it is not likely to hold or fix sulphur. The deposition of iron oxide in colder parts of the system, as would otherwise accurate likely to fix and retain

sulphur gases, and thus markedly affect the yield; this deposition is one of the causes of progressive yield drop during the life of a tube, the yield showing a maximum with a perfectly clean new system and slowly falling as the tube becomes fouled with slag and oxide adhesions.

Use of a refractory plug in the furnace is a great help in retaining ferric oxide dust in cast iron sulphur determinations. The combustion boat must be more than 1 in. from the plug, otherwise molten ferric oxide causes choking.

One of the probable causes of low sulphur recoveries is that some of the sulphur trioxide formed may pass through the absorption system as an unabsorbable mist.

Carbon determinations have presented any real difficulties for some general needs have time all been met by the dry combustion procedure. Modern developments in the production of super-pure iron and 4 per cent silicon iron, where carbon contents exceeding 0.01 per cent become of critical metallurgical importance, have served to emphasise the deficiencies of this conventional procedure for these specialised needs.

To a lesser extent this is also true of the Special Steel Industry where carbon specifications of 0.03 per cent (max.) are being laid down for certain classes of stainless iron and steel. As a result, carbon determinations expressed to the third and fourth decimal place are being demanded.

COMBUSTION PROCESS MODIFIED

An attempt has been made to meet the present urgency as far as low carbon stainless steel is involved, at the Brown-Firth Loboratories by developing a scaled-up version of the normal combustion process. Carbon combustions are at present being carried out on 16.362°g. of stainless steel, which amount is six times the normal factor weight of 2.727.

The conventional apparatus has a producibility level of about ± 0.01 per ce. For work in low ranges the process is to much affected by blank variation. A errors are incurred due to computing a weight differences from weighings of the mass, for example, absorption by 100-120 g.

A large tube 30 in. long with an intaction diameter of $1\frac{1}{2}$ in. and operating at 1.20 1.300°C, is used in the scaled-up combitation system. The boats are of large ($4\frac{3}{4}$ in. by $1\frac{1}{8}$ in. by 5|8 in.) and accommitate the full charge of 16.362 g. of starillings or millings. The boats are prignited at 1,200°C, before use, and give residual blank of only 0.0004 g.

The absorption system includes an or size Arnold bulb, containing chrom sulphuric acid to absorb sulphur gases, I the CO₂ absorption bulb of Mala, pattern is of specially small design, 4 in \$\frac{3}{1}\$ in, so that its total weight when pack with soda asbestos is only about 30 Combustion under these conditions is star and placid and the exothermic heat for such a large charges ensures the completiusing of the whole mixture. The flux 7 g, of red lead, pre-ignited before use 450° C.; after this treatment the red-Je blank does not exceed 0.0003 g.

Total blank in the process is only about 0.7 mg., and the carbon equivalent of the on a 6 x factor weight charge is only 0 eV per cent. carbon. Reproducibility is the maintained at + 0.002 per cent. for total operation of large batches.

Other possibilities for development of conductimetric measurements after about tion in barium hydroxide, and the development of radio frequency or induction to bustion units.

For research purposes, determination in the fourth place, for example 4 000 per cent., can be obtained by refinemethods of measurement, such as the k

pressure method in which the CO₂ evolved by combustion is trapped by freezing in liquid oxygen and then released in a vacuum system, where it is collected and evaluated manometrically.

Determination of carbon in steels by the copper-potassium chloride method, while not obsolete, is not entirely satisfactory, as recovery of both elements is incomplete. Again, the procedure of dissolving the steel sample in copperpotassium chloride solution is too timeton uming to be of use in routine steel in tysis.

ESTIMATION OF TIN

The most common method for deterning tin consists of reducing it in the steel solution either directly or after a separation as sulphide, the reduction being effected with a metallic reductant; the reduced tin is then titrated with standard oding or jodate.

Metallic reductants for tin include intimony, aluminium, nickel, lead and ren, but the bone of contention at the mesent time is the relative merits of the intimony-aluminium and nickel reduction movedures. By antimony-aluminium reduction is meant reduction with aluminium netal in presence of a dissolved antimony salt. This is rather a different case from notallic antimony reduction which has been rejected by Evans and other workers.

Objection to antimony is that the atotion accuracy is a critical function of anomony particle size; a coarse antimony process low results due to incomplete reduction and a finely ground flour gives high traits may be obtained at will, merely by altering the grading of the antimony flour, and correct results are mainly a matter of hance.

By using a combination of aluminium metal with an antimony salt in solution, netallic antimony is precipitated in solution n the form of a sponge of uniform charac-

teristics, and it is possible to control the reduction so that only a slight excess of antimony metal persists through the boiling interval for reduction.

Evans has reported that as much as 8-9 per cent. of the tin present may be lost in the antimony residues, although this is not the case for the very small amounts of tin involved in steel analysis; indeed, proved and tested methods have been put forward in turn for plain and low alloy steels, for highly alloyed steels and finally for ferrotungsten, by official Bisra committees, and approved by Bsi.

In spite of this, however, the antimony pro-nickel school has many adherents. The experience of the industry subcommittee, which carried out the tin investigations, was that nickel reduction (using an etched and activated spiral) was relatively slow, and that the reduction was often uncertain and incomplete if the spiral was not properly activated by etching in strong salt solution. Another point was that the green colour of the solution of dissolved nickel salts impaired the sensitivity of the end-point.

COBALT DETERMINATION

An improved method for determining substantial percentages of cobalt is required. The nitroso R salt absorptiometric procedure is easily the best available, but it is best adapted to a moderate range of cobalt content, and, in order to extend its use over the wider range required, semi-micro fractions must be used.

The classical gravimetric procedures are few in number, restricted in scope, tedious in operation and poor in performance. The a-nitroso-B-naphthol method, for example, is completely unselective. Residual unremoved iron and chromium, and also copper, are precipitated with the reagent. Finally, the cobalt residue is of uncertain composition, and the ignition

product, while weighed as Co₂O₄, often contains CoO.

Precipitations as cobalt sulphide are not possible if nickel is present; again, the ignition product is of doubtful composition and may contain residual sulphur compounds, such as CoSO₄.

Electrometric titration with potassium ferrocyanide in ammoniacal citrate medium is probably the best alternative to the nitroso R salt procedure. Some workers claim satisfactory results in the analysis of Kovartype materials (Ni, 30 per cent.; Co, 17-18 per cent.), although the process requires empirical calibration and for certain steels involves a rather doubtful manganese correction.

The dimethylglyoxime reaction, with or without cyanometric titration, meets most requirements for nickel determinations, but the most pressing need is for good separation from cobalt. Cobalt interferes in glyoxime precipitations, contaminates the precipitate and may cause partial suppression of precipitation; interference is controlled by oxidation with hydrogen peroxide to the cobaltic state, but this fails then the cobalt/nickel ratio is unfavourably high, with the result that determinations of small amounts of nickel in high cobalt steels are uncertain and unreliable.

With Kovar-type materials, the cobalt contamination problem is acute. X-ray examination shows that the precipitate consists of two phases—the nickel dimethylglyoxime complex and an iron-cobalt complex. This, however, only occurs when the iron is present in its higher valency state. A complete separation can be effected if the iron is first reduced to the ferrous state with sulphite.

Copper interferes to a lesser extent. Thus, large amounts cause partial inhibition of the nickel reaction, and large amounts of glyoxime reagent must be added, while contamination of the precipitate

with copper occurs at quite low cop concentrations, and this necessitate; petitive treatments.

BORON DETERMINATION

Determination of traces of boron, example, 0.005 per cent., is one of most difficult of analytical problems. I classical method, consisting of volat. I tion of boron with methyl alcohol and to tion of the distillate with standard so hydroxide, is quite unsuitable for the tramounts added to steel.

Choice of methods is restricted to very limited range of rather unsatisfact colour reagents, such as quinality (1: 2: 5: 8-tetrahydroxy-anthraquing and curcumin or turmeric.

Quinalizarin is of unstandard quality, and results can only be related calibrations prepared for each bottle of reagent. The reagent must be prepared strong sulphuric acid, 90/98 per cent. Contration, and variations of performance appear to be critically related to minutations of sulpuric acid concentrations.

A pronounced purple colour is exhibited by the reagent solution itself, and blue boron complex must be measured comparing gradations of colour from pale-purple of the reagent itself to the blue, which occurs at about 0.1 mg boron per 100 ml. This is equivalent 0.01 per cent, boron on a 1 g, steel he and therefore all amounts below this younget be measured by matching modificant of the purple reagent base colour

CRITICAL CONTROL NECESSARY

Curcumin, the alternative reaged evelops a red colour with boron on evaluation to dryness to hydrochloric acid setions after treatment with oxalic acid, red colour is then extracted with alcohol and compared against a prepared stand series. Very critical control of reacexcess is necessary, as the red boron of

x is modified by the orange yellow our of the reagent itself.

There are also difficulties of application h both these reagents such as loss of ande boron compounds during solution, difficulty of concentrating or evaporat-solutions other than in alkaline d im, pick-up of boron from glassware, 150 on.

Procedure based on that of Rudolf and chinger is the simplest, and consists of mon of the steel with sulphuric acid in reflux, after which the ferrous sulfile is salted out in 95 per cent, sulphuric it and quinalizarin added to the concented extract. Alloy steels giving coloured toolutions, for example, chromium steel, make a separation procedure, mercury hode electrolysis affording a good furation from boron; separation of iron, omium, etc., from boron is also made his sodium hydroxide, and this is the tration which normally precedes the offication of the curcumin reagent.

The usual gravimetric methods, based hydrolytic precipitation as tungstic d and ignition to the oxide are of all amounts of tungsten in steel. Below set 0.2 per cent. recovery is usually remely poor and amounts of the order 0.1 per cent. or less may escape notice rely.

Various expedients have been tried in the to improve the yield, but without inked success, and it is noteworthy that it of these devices lead to increased recipitation of molybdenum. In the since of molybdenum it is easier to just the conditions to provide a quantitativelyicld of tungsten.

Molybdenum contamination is inenced by a variety of factors, such as concentration of the two elements in lution, the ratio of their respective contrations, the acidity of the solution and the use of organic precipitating or flocculating agents.

Conditions which favour a quantitative yield of tungstic acid also favour increased molybdenum contamination. Thus minimum acidity, sulphurous acid hydrolysis from a ferrous solution, cinchonine, rhodamine B, and so on, all improve the tungsten yield, but the residue is liable to contamination from molybdenum, particularly when large amounts of both elements are present.

On high tungsten/molybdenum steels the contamination is so serious that in applying the B. S. rhodamine B procedure to high speed steels (7 per cent W, 4 per cent Mo) 12-25 mg. of MoO₃ have been found in the WO₃ residues.

The ideal reagent for tungsten must, therefore, be not only more efficient than existing ones as a tungsten precipitant, but it must also be more selective. It must as well be capable of application under conditions which permit control of molybdenum coprecipitation, it must, for example, operate at a relatively high acidity 1-2N with respect to hydrochloric acid and be effective in an oxidised iron solution.

In the meantime, the existing procedures are reasonably satisfactory for medium and high tungsten content ranges, and in the absence of much molybdenum.

Apart from this, there is the dithiol absorptiometric procedure, which meets the most stringent accuracy requirements down to the lowest content levels, but is rather complicated in operation for regular use as a routine procedure on batch control.

TUNGSTEN DETERMINATION

Tungsten may be determined in the presence of columbium by the dithiol procedure, the columbium being separated by treatment with phosphoric and sulphuric acids.

Methods based on the tungsten-thiocyanate colour have also been used extensively in recent years. It is certain that this reaction is critically affected by variation of conditions and the most exact and rigid standardisation is necessary. The most recent version of this method to be tested by the physico-chemical analysis subcommittee of Bisra as shown real promise; in this procedure the reaction is carried out in hydrochloric acid (1:1), and titanous chloride is used to reduce the thiocyanate complex. There is interference if much molybdenum, copper or vanadium are present.

Polarographic methods have not yet been developed for the determination of tungsten in steels. So far, only lead and copper have been determined in this way.

Molybdenum is still determined by the old caustic soda lead molybdate process and by the «-benzoin oxime precipitation method. The application of both these methods is becoming restricted by the interference of residual tungsten.

Residue treatment to remove co-precipitated tungsten is extremely difficult and it is therefore not surprising that steel chemists are turning to the thiocyanate absorptiometric process.

This method is dependent on a somewhat critical balance of reagent concentrations, and at very low molybdenum concentrations the bleaching of the corresponding ferric thiocyanate colour is erratic and incomplete. There is always a small residual ferric iron colour in the lowest ranges, and this accounts for the irregularity of the curve near the point of origin.

Determinations in the lower range are subject to iron blank values of comparable magnitude to the amount of molybdenum present, with the result that determinations in the region of 0.02 per cent or less are of low accuracy, and may be as much as 100 per cent in error. This residual iron blank can be reduced by increasing the stannous chloride concentrations.

INSOLUBILITY CAUSES INTERFERENCE

Interference from copper occurs, he ever, due to the insolubility of cupr thiocyanate, and this becomes a marked with increasing stannous chief concentration. The problem, therefor, to find the best compromise between reduction of iron blank and the incident of copper interference.

Use of titanium salts is now investigated by the Brown-Firth Laitories. These salts appear to catalys spontaneous and complete bleaching a ferric colour and permit the most favouabalance of stannous chloride and thiod concentrations to be used.

Mercury cathode electrolysis is repapplied to steel solutions for a variety purposes, but its full exploitation still in the future. Present work in the Bro-Firth Laboratories is being directowards the development of an apparacapable of removing as much as 10 g iron chromium, nickel, etc., in a matter one to two hours. Several difficulties been encountered particularly with climium-rich solutions, but a point has be reached where satisfactory conditions be specified for steels soluble in sulph acid solution.

SOME FURTHER PROBLEMS

Further problems include the treat of carbide residues from alloy steels the application of solvents other the sulphuric acid; particular difficulties in oxidised ferric solutions. If these pilems can be solved a field of great scope be opened up, particularly in the deternation of residual and trace amount elements such as aluminium, titanzirconium, vanadium, calcium, etc.

As regards the determination of alv nium in steel, the aluminium may determined by precipitation as the pl phate after mercury cathode electrois. The procedures of Gentry and Sherring (1946, 1950) using a 1 g. sample have, however, given satisfactory results. Here aluminium oxinate is formed, extracted with chloroform, and the absorption of the extracted solution measured. The aurine tricarboxylic acid procedure is unsatisfactory.

In miscellaneous determinations it must be emphasised that considerable segregation of lead often occurs in steels. Hence, lead should always be estimated on at least 10 g. samples, though some workers entinue to use 1 g. samples. The folly of this latter procedure may best be illustrated by a recent case where a bar of steel of about 1 in cross section and 1 ft. in length gave on analysis no lead reaction at one and and 0.25 per cent of lead at the other. Steels made by the Ledloy process, however, are less likely to suffer from aggregation.

The most satisfactory method for the determination of oxygen in steels is that based on vacuum fusion. Methods based on aluminium reduction either in hydrogen or in vacuo are not very popular, as the blanks often give trouble.

For phosphorus the Vaughan procedure is unsatisfactory, due among other things to the fact that losses are incurred by spitting of the solution being evaporated. In batch analysis of phosphorus it is quicker to titrate the phosphomolybdate precipitate with caustic alkali than to measure the absorption of the molybdenum blue formed on subsequent reduction.

The phosphomolybdylvanadate method of Harrison (1933), who determined phosphorus in cast iron, is sensitive to interferences in solution and to temperature effects. Again, it is less sensitive than the molybdenum blue procedure.

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TABLETS are generally given a coating of a particular kind for a number of tensons. Tablets containing such unpleasant drugs as quinine or cascara sacrada are more palatable when sugar-coated, therefore sugar coating is applied to this type of tablets for this reason. Another purpose of coating is to improve the appearance of a mottled tablet; the mottled unavoidable and due to ingredients in the recipe. Some tablets are liable to deteriorate in stock through absorbing moisture. Deterioration can also take place through chemical reaction due to absorption of moisture. In this case a sugar coating will act as a protective shell. Many tablets have to withstand a tropical climate; sugar coating would not be serviceable under these conditions, therefore a gelatine coating is advisable.

COATING EQUIPMENTS

In coating tablets the following plants and accessories are required:—

The number of coating pans necessary will depend on the output required. The usual suize of pan is 30 inches in diameter. A pan of this size will hold approximately 35 lbs. of 3 grain uncoated tablets. This batch when coating is finished should weigh approximately 70 lbs. Coating pans may be made of galvanised iron, copper or stainless steel.

In addition to coating pans, one polishing pan is also required. This pan may be made of galvanised iron. It is advisable to keep a separate polishing pan for white tablets if various coloured tablets are to be polished.

For sugar coating a syrup is used, and sufficient should be made up to coat the batch in hand. A container to held ten gallons of B. P. Syrup (i.e. 2 parts Sugar, 1 part Water) would suffice for the coating

of the 70 lbs. of tablets in two pans, the approximate finished weight of the batch being 150 lbs. Stainless steel is the most suitable metal for the container as it does not corrode and it is easier to clean.

The most convenient way of applying the syrup coatings is by means of a stainle steel ladle holding about four fluid ounce. It is easy to manipulate and allows the solution to be distributed evenly over the tablets as they are rolling.

A glass stirring rod will also be usquired to keep coloured syrups intimate), mixed before applying to the tablets.

A pair of dispensing scales kept handwill enable the coater to check the progress of his work. A few tablets weighed from each pan will reveal whether the respective pans are giving an equal performance.

A small container with a perforated top is also required for applying dusting powder to the tablets.

METHODS OF HEATING

In coating tablets it is necessary to dry thoroughly each coating before giving a further application of coating solution. Heat is usually employed, and the method of heating can be by gas, electricity a steam. The heat is transmitted to the pairs by hot air.

A fan blower provides the air current. The air is preheated and blown through the pipes directly into the pans. The pipes should be fitted with a fine messing gauze near the fan, to prevent foreign matter entering. The hot air can be regulated by control slides which are fitted into the piping. With steam heating the coating pans can be heated direct by steam coils. The coils are arranged around the outside of the pan, keeping a constant supply of heat to the body of the par which automatically dries the coatings as

they are applied. Steam heating is useful for quick drying of tablets which readily absorb moisture, but for general coating purposes a hot air blower is preferable.

After coating the tablets with syrup, dusting powder is sprayed over the tablets to prevent the tablets from sticking one another. In many cases the addition of dusting powder is continued upto approximately one-third of the total coating. This chortens coating time by giving a quick hold-up to the tablet. A good dusting powder for this purpose can be made hom:

Starch 6 lbs.
Talc 1 lb.
Powdered gum acacia 2 oz.
Mix and sift through a fine cloth.

COATING PROCESS

Sugar coating is probably the simplest type of coating to process. After an initial batch has been coated and the difficulties discovered and remedied, a formula can be worked out for future batches.

To illustrate the coating process assume the following to be the formula elected (3-grain tablets to be coated to 6-gr.):—

Unsting powder 4 ... (approx.)

B. P. Syrup consisting of 25 lbs. Crystal

E. P. Syrup consisting of 25 lbs. Crysta tigar (approx.) and 12 lbs. water.

It should be noted that tablets for coating are usually more compressed with what are known as sugar coating funches" (or s/c in short), these having a deeper concavity than standard concave punches.

To start operations, switch on the fan. also the heat. Set the pans revolving and the tablets will commence to roll. Now

make the first application of syrup. A batch of 35 lbs. of tablets will take approximately 3 fl. ozs. to moisten. After the syrup-application (which should have been well distributed over the batch) sprinkle some of the Dusting Powder. A few ounces of Dusting Powder should be applied at the moment the tablets commence to fall away but are still "tacky." When applying the Dusting Powder shut off the air temporarily until the powder is absorbed, and then the vent can be opened again. Heat should be moderate, and the air supply likewise, until the tablets are dry. A full draught of warm air can then be applied to ensure the tablets being thoroughly dried before the next application of Syrup. The Syrup and Dusting Powder applications continue in this manner. A 35 lbs. batch of 3-grain tablets will require a total of about 4 lbs. of Dusting Powder. When this amount of Dusting Powder is applied the rest of the coating can be continued with warm Syrup alone. At this stage tablets will have an uneven appearance owing to the Dusting Powder having built up on the surface. The continuance of Syrup coatings will smooth the tablets cut providing they are applied gradually and the Syrup is not allowed to get too warm. A good tip for this smoothing out process is to apply the Syrup, shut off the air, and let the tablets roll as long as possible without air. They will roll in the pan in a syrupy mass and gradually fall away. When the tablets have separated, apply the air and finish off the drying. Occasionally bits will form in the pan. These are small grains of sugar which are gradually building up. The tablets should be taken out and sifted before the small pieces increase in quantity. If these small granules are allowed to roll in the pan, they will eventually adhere to the tablets and be covered over as the Syrup is applied. They will form unsightly bulges on the surface of the tablets.

The coating should be continued until the tablets weigh approximately 6 grains. At this stage they should be smooth and have a hard surface suitable for polishing. To guarantee a hard coated finish, run the pan on cold air and give the tablets one or two coatings of cold syrup. Allow the tablets to roll until dry—but not longer as a powdery will show up and this is detrimental to polishing.

It is advisable to spread the tablets on suitable trays overnight, and leave in a closed cupboard, polishing them the next day,

POLISHING

The polishing can be carried out in the polishing pan which has been previously coated with a thin layer of Paraffin Wax. The polishing pan will fit on the same stand as the coating pan, or a pan complete with stand and motor can be carried out in about twenty minutes. It is only necessary to let the tablets roll in the pan and they will take on a thin film of wax through constant friction as the pan revolves. If a high polish is required a sprinkling of dissolved Bees-Wax in Ether will give the desired effect. Time taken for the total process will depend on the adaptability of the operator. Naturally, with experience he will improve his speed and technique.

The process outlined above is merely basic. In many cases experienced coaters use Dusting Powder almost to the end and then finish off with cold Syrup, but they have the skill and knowledge to control the process. They know how and when to apply the Dusting Powder, also the quantity to use. They also know when to apply heat and when not to do it.

There are certain tablets which must not come into contact with moisture owing to the nature of the ingredients. Any absorption of moisture from the Syrup in this case would be fatal, as the coating

of varnish to the tablets first. Give the a thin protective shell and then the cost ing can proceed. A good varnish for the purpose can be made up from Gain Sandarac and Spirit. Tablets such a Cascara Tablets should be given a good sub-coating to prevent dark patched appearing on the coating.

COLOUR AND CHOCOLATE COATING

The basic formula for sugar coates applies to coloured coated tablets, and tablets which are chocolate coated. 11only variance is that with the former in Syrup is tinted with the desired cole The latter has a proportion of Chocol Powder mixed with the Dusting Pow .. which is used in combination with the should be suit Syrup, The Syrup able coloured with Chocolate Bree-Paste. Coloured Syrups are best applied in the following manner: a light shall first, and subsequent applications of slightly darker tint, until the desired shad is reached. By this method an even resi will be obtained.

GELATINE SUB-COATING

Hygroscopic ingredients can cause endless trouble if the initial stage of cost ing is not thoroughly carried out. A grow sub-coating with Gelatine Solution and Dusting Powder will suffice to counter a any troubles from this source.

The Gelatine Solution can be made a from one part Gelatine, 12 parts Sugar, 16 parts Water. This mixture should be warmed and stirred until thoroughly described. Use sufficient to moisten slighely and continue to apply until a trul protective shell is formed around the tablet. Always apply warm as there will be tendency to gelatinise if the solution a allowed to cool. If this solution does he pen to gelatinise through being left standing, it will revert to solution again on re-heating.

-Substitution of Coconut Oil in Soap.

in the manufacture of high grade soaps and it usually forms 25-30 per cent of the stal fat used. The soap is easily soluble a water, giving profuse lather and possesing excellent washing and detergent apperties. As there is a shortage of dible fats in this country at present, there is an imperative need for substituting occurry oil by other fatty materials in the cap and hair oil industries.

It is for this purpose Messrs S. C. Jupta; J. S. Phadnis and J. S. Aggarwal f the National Chemical Laboratory, Joona, have investigated to find out the est substitute of coconut oil and published he following article in the Journal of intentific and Industrial Research for the enefit of the soap-makers.

The excellent properties of coconut oil cap are mainly due to the presence of nutic and myristic acids as major compoents of the total fatty acids of coconur oil. he effect of alkyl chain length on the procries of soap such as Herbig number, and of sinking and drop number has been vestigated by Shirolkar and Venkatara-140. Of the various saturated fatty acid 6 ps. sodium and potassium myristates a, been found to possess the maximum siting action, foaming and detergent proettes at ordinary temperatures. As accible oils with myristic acid as a major on ponent are not available in sufficient mounts in India, attention has been writed in the investigation of lauric acidich oils. Seeds of Actinodaphne hookeri tomodaphne angustifolia, cinnamomum amphora, Laurus nobilis, Litsea chinensis, alsea Setafera, Litsea citrata, and Litsea eylanica are available in Indian forests and their fats have been found by Puntamekar; Puntambekar and Krishan; and follins to contain 43 to 96 per cent lauric

acid. In the present investigation the seed fat of Actinodaphne hookeri locally known as Pisa fat, is used in place of coconut oil in soap. Its fatty acid consists of 96 per cent lauric acid. Castor oil and groundnut oil mixtures along with Pisa fat have also been tried.

Hydrogenated rosin is a valuable ingredient of soap preparations. Its sodium derivative has been recommended as a substitute for coconut oil in soap. The sodium sait or rosin was used in admixture with other sodium soaps to ascertain whether it can replace coconut oil in soap manufacture. Lather value, hardness, wetting and detergent tests were carried out on each sample of soap. Soaps thus prepared were found to be comparable to the usual tallow-coconut oil soaps in many applications.

EXPERIMENTAL

In order to obtain alkali-free neutral soaps the oils and fats used in this investigation were first hydrolysed to fatty acids and neutralised by the addition of requisite amounts of a strong solution of caustic soda. The reaction was completed by heating on a water bath for I hour. The sedium soap so formed was dried in the sun to a moisture content of about 10 per cent. Hydrogenated rosin was similarly treated. The soap was then milled in a three-roll mill and the moisture content was finally adjusted to 10-12 per cent as determined by the xylol method. Forty grams, of this material was moulded to a cylindrical cake of 14" diameter by pressing for 5 minutes under a pressure of about 250 lbs per sq. inch at a temperature of 40°C+50°C. The cakes were aged for a week in closed glass vessels. The following determinations were made: -

1. LATHER VALUE. —The lather value was determined by shaking 50 c.c. of 0.2

per cent soap solution in one litre stoppered graduated cylinder for 30 sec. and noting the volume of the lather produced after 5 minutes. The stability of the lather was found out by noting the volume again after 24 hours. The values were determined at room temperature (25° to 30°C.).

- 2. WETTING TEST. The concentration of soap required for causing the sinking of a 5 grms. of skein of grey cotton yarn in 25 c.c. at 40° was determined by Drave's method.
- 3. HARDNESS. The comparative hardness of different samples of soap was determined by determining the weight (in pound) required to pierce through and break the cake. A bronze, hemisphere, 2 cm. diameter was employed for this purpose. A cement testing machine was suitably modified for carrying out this test.

4. Detergency Test - A piece long cloth was first boiled in sodium co bonate solution, thoroughly washed w water and dried. It was soiled in petroler to which carbon black (1 per cent.) a groundnut oil (2 per cent) were add. The cloth was dried in the sun by spica ing horizontally on a frame. Test-piec $5" \times 5"$ having an even shade was chose The test piece was shaken in 100 cc 0.3 per cent soap solution, for half an he with distilled water. The test piece wa then dried in shade and the extent of removed was examined visually. T above test was done in duplicate with the sample of the soap. The composition various soap samples together with the lather value, wetting test value and har ness are given in the following Table 1 detergent qualities of all the samples we found to be almost identical.

Drave's Wetting

COMPOSITION AND PROPERTIES OF VARIOUS SAMPLES OF SOAP

	Acid Composition of Soap.		Lather	test values (Soap concentration required for Value 25 Sec. wetting		
			5 min c. c.	24 hr. c. c.		Hardy ess
1.	Tallow 75 p. c. + coconut oil 25 p. c.		230	195	0.56	5.
2. 3.	Tallow 75 p. c. + pisa fat 25 p. c. Tallow 75 p. c. + pisa fat 15 p. c.	** **	250	210	0.72	Cil.
••	+ stearie acid 10 p. c. Tallow 65 p. c. + pisa fat 25 p. c. +	1001014	200	160	0.88	6.4
	castor oil 10 p. c.		300	265	0.55	$f_0 \leftarrow f_0'$
	Tallow 65 p. c. + pisa fat 25 p. c. + groundnut oil 10 p. c.		280	230	0.57	6 ()
	Tallow 50 p. c. + castor oil 20 p. c groundnut oil 20 p. c.	1.	280	240	0.49	15
	Tallow 75 p. c. + rosin 25 p. c. Tallow 75 p. c. + hyd. rosin 25 p. c.		210 240	170 200	0.56 0.67	911
9.	Tallow 65 p. c. + Pisa fat 25 p. c	+		200	0.52	61 .
10.	Rosin 10 p. c Tallow 65 p. c. + pisa fat 25 p. c	+	240			
11	hyd. rosin 10 p. c. Tallow 60 p. c. + groundnut oil 15 p. c	r	280	240	0.56	76 "
	+hyd. Rosin 25 p. c.		270	200	0.56	gn.,
12.	Hyd groundnut oil 75 p. c. + pisa fat 25 p. c	2004 PÅ	290	Thinned	0.57	5 v. 1

.

DISCUSSION

From the data given in the above able it will be seen that substitution of auric acid rich in Pisa fat for coconut oil ias increased the lather value in samples 4 and 5. Less lather has been obtained a sample 3 due to the partial substitution In longer chain stearic acid in place of list fat. Again, substitution of 10 per em Castor oil and groundnut oil in amples 4 and 5 for the same amount of illow (sample 2) has resulted in a marked icrease in the lather value. Drave's jetting test values for these two soaps at also been quite low and are quite close , that of coconut oil soap. They were to found to be less hard than others beture castor and ground oils are known vive softer soaps than oils containing to lominantly saturated acids. The effect f the soap from these two oils is very larly indicated by the results of the alites of sample 6 containing tallow 60 e, cent, castor oil 20 per cent and groundor oil 20 per cent. This soap has given wher value higher and wetting test value mer than coconut oil soap (Sample I) lihough the hardness has been slightly mer than the latter.

Hydrogenated rosin soap has given a who good lather value (samples 8 and 10) nd has proved better in comparison with releasing rosin soap (samples 7 and 9). It has retards spotting in soap on storage has how usually takes place when ordinary to it is used. But a combination of lauric cit soap along with that by hydrogenated on a has definite advantages. Substitution of Pisa fat (lauric acid) by groundnut and hydrogenated rosin (sample II), on ever, lessens the stability of the lather of the soap.

An attempt was also made to substitute tallow by hydrogenated groundnut oil (1. V. 20-22). Although a good amount of lather was obtained, it was very thin and subsided within 24 hours. This may be due to the conversion of oleic acid mostly to stearic acid and partly to iso-oleic acid during hydrogenation. The soaps of these two acids have less solubility and wetting action at low temperature (25°-30°C). Other soaps (Nos. 2 to 10) have given lathers of nearly equal stability and are almost identical to coconut oil soap.

The hardness of all the samples of soaps with the exception of No. 6 have been found to more than that of coconut oil soap (No. 1). This may be due to the presence of 15-20 per cent copric and other lower acids present in coconut oil. The existence of these acids in coconut oil is definitely a disadvantage because their sodium salts have very poor lather values and wetting action. However, they are very soluble in water and are removed during the salting out stage. But these acids have not been removed in the present work and were allowed to form a part of the soap. The differences in hardness may not be regarded as a great drawback because by proper formulation of the oils and fats, it may be adjusted to the desired limit. Samples 4, 5, 6 and 10 are quite satisfactory as substitutes for standard coconut oil soap-

CONCLUSION

From the above experiments it may be concluded that coconut oil can be substituted in soaps by suitable mixtures of lauric acid-rich fats, castor oil, groundnut oil and hydrogenated rosin.

NECESSITY OF ELECTRICITY FOR THE DEVELOPMENT OF METALLIFEROUS MINES IN INDIA.

By Prof. S. K. BOSE, A.R.S.M., B.Sc., (Min.) (London), M.M.G.I., F.G.M.S.

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METALS form one of the earth's most important resources in the support and enrichment of human life. With the progress of civilisation consumption of metals has steadily increased in all free countries. Hence in Free India the need for more metals should naturally be realised in view of rising living standards as well as increasing population. Everywhere there should be a sustained drive to bring into use mineral resources as yet untapped, to build up with the revenues obtained from this source more productive and diversified economies.

For the necessary development of metalliferous mines in India cheap electrical energy is of fundamental importance specially in those areas where coal is not locally available. For example it may be noted that in Mysore State the Kolar Gold Field could be developed to great depths of about 10,000 feet by the utilisation of the hydro-electric power of the Cauvery Palls since 1903. Annual consumption of power in Kolar Gold Mines has now exceeded 100.000.000 K. W. Hours. Some time back for the Lead-Zinc-Silver Mines of Burma Corporation Ltd. Hydro-electric power was obtained from the neighbouring Mansam Falls where several turbines were installed with an aggregate capacity of more than 10,00 K.W. For the development of Rand Gold Mines in South Africa as early as 1906 the most important power supply system originated with the idea of developing the water-power of the Victoria Falls. The present capacity of the power

stations for Rand Mines is more than 200,000 K. V. A. which was the figure when I visited that country nearly a decide ago. The hydro-electric development that progressed in Canada.

As compared to the figures of relative above the aggregate horse power of circularical plant used in the coal mines in India increased from 122, 833 in 1945 to 131 MI in 1946, and in metalliferous mines the respective figures were only 8,568 in 1945 and 10,43q in 1946 as published in the Annual Reports of the Chief Inspector of Mines in India excluding the States.

Since the separation of Burma it has become necessary to develop the Lead-Zinc-Silver Deposits in India, for which I have personally examined the workings for proving such deposits in Rajasthan State. As a result of intensive investigation during the last war valuable deposits have been located at a place known is Zawar about 29 miles from Udaquir There in Mochia Magra Hill it was said mated recently to have more than 1,37 \ (4)0 tons of ore containing at least 20% Lead and 7% Zinc with some Silver. Be idea this hill there are at least thirty other like in the same area where ancients had . \ tensively worked for such values. Cool and other fuels are not available locally and not far from this area I have een excellent sites for large reservoirs of water which in my opinion can be harnessed for irrigation of the land and generating necessary power economically for the rapid development of these and other valuable

metalliferous deposits for the amelioration of the condition of the people as well as for their protection.

Incidentally these large reservoirs of water in this State will change the face of the Earth to the satisfaction of all and revive the past glories though one may not easily believe such a possibility at the present time when the hills in this area appear to be so barren and are so close to the famous deserts of Rajputana. But when one finds more than million tons of sing heaps in an area which is far away tom coalfields one naturally concludes that the ancients must have consumed the local timbers for the mining and smelting of these ores. Without foresight the consumption of timber might have been so ruthlessly carried out in those early times hen the land was in the height of its glory that the area became deforested and the climate was so affected thereby that the legion appears be arid at present. So I hope the land will be smiling again in the near future by the successful planning and development by modern scientific methods along with the destiny of Free India.

I received the inspiration for this paper while I was reading the paper entitled "Metals in Relation to Living Standards" by Dr. D. N. Wadia, Director, Bureau of Mines, Government of India, and have quoted the very first centence thereform.

To support my concluding remarks as tated above I quote the following in detail from the book entitled "Man and Metals" by T. A. Rickard. Page 779. "In process of time the demand for fuel caused the destruction of the woodlands to such an extent that many regions became deforested, and the climate was changed thereby. For example, the smelting of silver-lead ore at the mines of Laurium contributed to the denudation of Attica. Plato, in the Critias dialogue, tells us that in the old days there was an abundance of forest on the moun-

tains. "Of this last", he says, 'the traces still remain, for there are some of the mountains which now only afford sustenance, to bees, whereas not long ago there were still remaining roofs cut from the trees growing there, which were of a size sufficient to cover the largest houses; and there were many other high trees, bearing fruit, and abundance of food for cattle. Morcover the land enjoyed rain from heaven year by year, not, as now, losing the water which flows off the earth into the sea, but, having an abundance in all places, and receiving and treasuring up in the close clay soil the water which drained from the heights, and letting this off into the hollows, providing everywhere abundant streams of fountains and rivers; and this proves the truth of what I am saying, "Attica, once well clothed with leafy verdure, has become an arid region. Cyprus has suffered likewise; once reputed the most fruitful island in the Mediterranean, it was stripped of its woods when it fell into the hands of the Turks, the consequences being a diminution of rainfull. the drying of watercourses, the formation of swamps on the seashore, and the prevalence of a deadly form of malaria. Other examples might be cited. The tumbled hills of the Sierra Morena, in southern Spain, where once great forests stood, are today bare, in destructive to the testimony activity of the miner, successively Iberian, Carthaginian, and Roman, who despoiled the woods for the charcoal needed to smelt the silver, lead, and copper ores of this rich mineral region. The modern mining districts of Colorado and Montana, all of which were started amid pine forests, are today bleak and bare, only the stumps of trees remaining to remind the newcomer of the days when the prospector found shelter under the spreading boughs. The effects of deforestation have been studied scientifically; it has been ascertained that the forest is a regulator of climate, because it decreases extremes of temperature in the

vicinity; the forest is cooler and more humid than the level country, it stores the snow and rain, retarding the melting of the one and conserving the other in its leafy soil, thereby enabling the accumulation of water to feed the springs that flow gently into the plain when required for cultivation. The coolness and moisture of the forest promote the condensation of the lower layer of clouds; the differences of temperature between forest and plain cause a healthful circulation of the air. the woods serve to check the destructive effect of violent winds. Deforestation therefore diminishes the rainfall, increasees the evaporation, causes extremes of temperature, and facilitates the destructive action of torrents, avalanches, and landslips. Such disastrous effects have ensued in many regions on account of the consumption of wood as fuel on the hearth and as charcoal in metallurgic furnaces. During later days the lavish use of timber in mines has caused the hillsides to be

denuded of their growth, as most of our western American mining district show

A typical example of deforestation is to be seen on the eastern slope of Sietra Nevada, overlooking the Trucee Valley where the cutting of trees to provide timber for the deep mines of Comsteel left the hillsides exposed to erosion so the today they are bleak, barren, and hideoa Most of the old mining regions tell the same tale, from Linares to Leadville, from Potosi to Porcupine".

In conclusion I may state that : India today we have a large number of metalliferous mines which are only at it, initial stage of development. With the supply of electricity they will surely be a position to step up their production of ores and completed the smelting thereof order to cope with the steeply rising the mands of metals for the amelioration of the condition of the people in Free Indiand their protection.

Jerren state s

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-ENAMELLING GOLD AND SILVER

THE idea of enamelling (in the jewell-er's sense and not as understood by the painter or cycle maker whose enamel is something different) is said to have arisen from observation of the effect when early metalworkers, spilling hot metal on sand (which is silica and one of the constituents of glass), noticed how the amalgamated mass exhibited colour. In course of time the colours arising from one metal and another composed quite a new range.

When in a molten state, glass absorbs particles from metals with which it may happen to be in contact, and by them it becomes coloured. Cobalt, for instance, gives glass a fine blue colour, chromium imparts a green. There, in few words is the clue to that delightful art of enamelling which gives us one of the most charming results in the whole of jewellery technique.

Here are some colours and the minetils responsible for enamelling gold and tiver articles:

Ruby red—.01 per cent gold chloride. Yellow—.015 per cent uranate of soda. Aquamarine—3 per cent bichromate of potash.

Emerald—10 per cent nitrate of copper.

Bottle Green-10 per cent oxide of

Blue—2 per cent black oxide of cobalt. Purple—15 per cent permanganate of tash.

All these make clear transparent enaicals; and if opaque enamel is wanted
virious oxides, like oxide of tin, are used
to make a basic whitish composition,
which can then be tinted like the transparent kind. The glass used, in crushed
form, is flint, which has 25 to 40 per cent
of lead oxide in it and is to that degree
more fusible and more refractive (i.e.,

more sparkle). The metallic constituent is likewise crushed in a mortar to powder and mixed with the powdered glass. It is laid into place on the silver surface of the object to be enamelled, the whole is placed in an oven, in the heat of which the powdered layer fuses into a glass-like covering. It will not be perfectly smooth, but is gone over with carborundum stone and water, after which two further coats of enamel may follow. To get final smoothness, the article is held against the revolving left mop of a polishing spindle charged with pumice.

The final coat of clear transparent enamel used on high grade work makes for a longer life, and consists of best transparent glass enamel ground up and melted in the furnace.

Now to answer the question of the young lady as to whether enamelled goods were washable; the answer is: Yes. Naturally one would not drop an enamelled vanity or toilet mirror into hot water, but the limits of treatment enamel will stand are such as could be expected from an article coated, you now realise, with a thin tilin of glass. As such it cannot be harmed by a sentle wiping.

Enamelled cigarette cases, vanities, brooches and wherever touches of enamel are incorporated in jewellery, as on earrings, rings, necklace beads, pendants, etc., all are coloured in this way; in the case of the larger articles the silver ground has often been given added interest by an engine-turned decorative surface, which sparkles through the enamel and gives a pretty effect that few ladies can resist.

The porcess named is a modification of (1) the basse-taille (Fr., low, to cut)

system, one of the five traditional methods of enamelling; in this the surface is recessed to receive the enamel. Of the remaining processes, the second and the third have a slightly different method of creating these recesses (not necessarily deep) to keep the flowing enamel under control; in (2) you can have wire soldered down on to the surface so as to determine limits to which the enamel must keep. This is rather on the stained-glass window principle in which lines of lead define the main drawing of the subject, and each department contains one colour, as it does also on the enamelled object. Based on the French word for divisions (cloisons). this is called Cloisonne Enamel. In it the gold or silver dividing wire will always be clearly visible.

- (3) The third system arrives at the compartments by a different way. The silver being fairly thick in the first place, you gouge out the required recesses with a graving tool, leaving a line of the original silver standing between each division. In effect, you "draw" by leaving untouched the original surface, just as a wood engraver cuts his printing block. This is called the Champleve (Fr., ground removed) process.
- (4) In the fourth method a dainty out most fragile stained glass effect in miniature is secured by having no support at all for the enamel and letting it be seen by transmitted light. This sounds almost mpossible, until you learn that the enamel was, in the first place, laid on a temporary ground, the different colours separated as before by wires. Afterwards, under the nfluence of heat, the enamel springs off

the ground and so becomes separated from it. In another method the retaining wires are bedded slightly into plaster and the enamel laid in the various compartments so formed, the whole being then fired.

(5) When the fashion is inspited that way, you will find the young ladies in the enamelling workshop painting birds and beasts, also flowers and, in fact, any pictorial subject from Windsor Castle to a Titian-haired beauty walking by the sea shore. If their skill can cope with spicets like this they ought to be called artists, and what they are doing follows the fifth enamelling process, the Limoges or Painted Enamel tradition.

Ground enamel is laid down, following in colour the pictorial design, but taking care that the colours do not mingle. After fusing by heat and storing smooth it may be that further colours need superimposing on those already there, as for example, a second colour pattern on dress. In this case it is a matter of going carefully to work so that later fusings of colour do not spoil the colour already set

Enamelling is done on gold as well as on silver, and the effect of the gold undertone, as on brooches, lockets, etc., is worth observing as giving more mellowness to the enamel. Gold intended for enamelling has a large proportion of silver in a making a paler metal. But, as showing what a critical operation enamelling can be, the presence of more silver so lowers the melting point of the sold that when the article is in the furnace care has to be used not to melt the gold itself whilst fusing the enamels.

-Printing Artificial Silk with Phosphorescent

Effect.

CERTAIN amount of progress has eccently been made in obtaining phorescent or faintly luminous effects designs on artificial silk fabrics. the printed articles so far produced, phosphorescence results principally igh the use of colours and products h absorb the rays of light during the or through artificial light, and transhem in the dark or in reduced light. slightly luminous designs have a rent glow in accordance with the its used and show up better in pale ired patterns, yellows, oranges, blues greens, than in reds, greys, black or dark colours. Besides this, they are rally more marked or visible on bright on dull grounds, and on white grounds r than on black or dark ones. her, with certain types of fabrics are clearer and more visible; success nding to some extent on the fabric ig a flat smooth surface, and the lance of strong or pronounced chanbetween the projecting portions of the the phosphorescence where ld remain either partially or totally en. They can also be used for prolustreless patterns on bright nds. In all cases the fabrics treated a special attraction of their own and patterns show up very prominently.

f before the application of the phosescent material a base of white or ir could be applied this has the proof of intensifying the effect of the nous colour by reason of the rduced tration into the fabric, and also to a an extent smoothing out the surface of lecoration.

The phosphorescence produced in the ed effects can be white, and can issue

from white or otherwise coloured lustreless designs or parts of designs on white lustreless rayon cloth. If it is in bright canary yellow it can be brought out from less bright yellow or red patterns; if bright greenish yellow from yellow patterns: if yellowish green from blue or grey patterns; if orange yellow from yellow patterns; if orange red from orange patterns; if neutral orange from medium orange or yellow patterns; if green from medium brown, slightly greenish grey and violet patterns; if blue from very light brown patterns, if violet from very light brown and light pea green patterns. A large number of varieties between the colour of pattern from which it is developed can be made very pronounced by adding aluminium bronze and zapon colours to the phosphorescent zinc sulphur colours.

Although progress has been made in the production of the above phosphorescent effects and designs on rayon cloth so that articles can now be launched on the market, the still undeveloped technique, the limitations of processing, and the few products at present at the disposal, restrict the field of exploitation. The number of applications, however, are quite sufficient to permit enterprising opening manufacturers who are in search of opening to work with every chance of success. There is little doubt that when scientists and technicians have given the matter greater attention and study, many improvements will be made, thus increasing the value, number and variety of goods produced. and in certain cases achieving permanent or persistent luminous patterns.

APPLICATION OF PHOSPHORESCENT FRINTED GOODS

Properly prepared phosphorescent

effects and designs on artificial silk fabrics not only permit the manufacture of women's and girls' clothing in an entirely new fashion, but they are also of special interest for other purposes. Rayon viscose cloth, having prints with a sufficient degree of phosphorescence can certainly be used with advantage for evening wear, in social gatherings, in festivities, etc.

Further attractions may be obtained by the printer supplying fabrics having phosphorescent designs of different nature across the width, which produce stripes that can be easily cut out of the pieces whenever required for making frocks. In other cases, articles having regular phosphorescent patterns running down the whole of the rayon viscose pieces may be required. These are specially applicable for the manufacture of loose-hanging frocks used without waisted effects or with a few folds as possible, as with this arrangement the luminous appearance of the pattern can be shown to its greatest advantage. Amongst the other applications of phosphorescent effects and designs there is the production of special varieties of curtain fabrics, furnishings, handkerchiefs, etc. It is easy to imagine, for instance, the advantage of curtains which show luminous designs during partial or complete darkness.

PRINTING PASTES

The printer has not yet at his disposal proper means for producing designs with very fine or delicate luminous details as the processes so far introduced render the production of these designs difficult or uneconomical. Designs without fine detail work can be obtained however, which are both attractive and interesting.

A three-colour article yields on bright viscose rayon material patterns of very satisfactory appearance and high phosphorescent properties, when exposed conveniently to light, is obtained with the following three phosphorescence produc-

ing pastes which also furnish an interesting scarlet red, blue, and yellow pattern when the respective yellow, yellow green and orange phosphorescences are not developed.

SCARLET RED

Fast zapon scarlet C.G. 0.5 parts Nitro-cellulose varnish 649.5 Zinc sulphide

(luminous) 250 Tricresyl phosphate 100

First dissolve the scarlet in the $r \approx 6$ cellulose varnish (called kasara varnish) and then incorporate the other ingredients in the order given.

Blue

Fast zapon blue C.G. 1.5 parts.
Nitro-cellulose varnish 648.5 ,,
Zinc sulphide (luminous) 250 ,.
Tricresyl phosphate 400 ,,
Mix as before.

YELLOW

Fast zapon yellow C.G. 4 par Nitro-cellulose varnish 649 ... Zinc sulphide (luminous) 250 ... Tricresyl phosphate 100 ...

The above phosphorescent colour are to be printed in the same way as bight varnishes; that is, the printing pastes are applied to the cloth, across the perfections of stencil plates, by the use of wooden knives. The stencil plates should have a thickness from 0.2 to 0.3 meters. The printing colours are in the case very dense so that they can not track along or through the cloth. They recall therefore only superficially acid over front. They can be diluted when neces to with butyl acetate.

The application of the printing pate across the stencil plate must be conducted slowly to avoid the formation of air bub.

Besides this it is advisable to leave stencil plates on the material from to five seconds after the application printing colours. Designs are formathis way, and the effects show up distinctly. The printed patterns, ared as above, generally dry suffive after a few minutes. For complete the cloths require to be hung for a paight or day.

he phosphorescent colours must not round more finely than the form in h they are supplied by the producers, he best phosphorescence depends having granules of a certain size. Some time, the phosphorescence in lark is slowly reduced, gradually ng altogether from half an hour to sur. After a short exposer to day light, artificial light of sufficient strength, shosphorescence returns to its full 19th. It is necessary therefore to reste the design from time to time with of light.

ROGRESS IN THE PRODUCTION OF PHOSPHORESCENT COLOURS

ertain progress has been made in the action of phosphorescent colours, the light producing effect is somedue to the presence of mixtures of parts of pure calcined zine sulphide. I part of copper sulphide. The copsigenerally added in the form of resulphate to a solution of sulphate action of convenient serength and subto the action of sulphuretted hymn. The mixture of zine and copper ide obtained in this way is calcined

for some hours at 1000°C. The resulting very fine white crystolline powder is dotted with good photo-luminiscence. The sensibility of sulphide of zinc to radio active rays is particularly important and it has been proved that light development phosphorescent colours is nearly exclusively existed by these rays. Regarding phosphorescence, the reduced purity of the sulphide of zinc is not of decisive importance, as products of satisfactory activity can be obtained with sulphide of zinc relatively tich in heavy metals besides copper. Of course, the percentage of these metals must not exceed a certain limit otherwise phosphorescence is no longer obtained, sometimes the activation of time sulphide is conducted by impregnating in a solution of radio active substances and drying at 100° C.

One may also obtain a sulphide of zinc that is tubo-lumnescent, i.e., becomes luminous through pressure, by impregnating 20 parts of the products with 15 parts of a 4 per cent solution of manganese drying and calcining for two hours at 900 C. There are also phosphorescent colonis prepared with boric acid. Phosphorescent colours can be rendered luminous through addition of radio active Generally these colours are substances. incurporated in a fixing or binding agent. Those with sulphide of zinc can be fixed through a solution of quin arabic, although this reduces the phosphorescence power. Gum arabic is therefore seldom used. Phosphorescent printing inks are produced by using linseed oil as fixing medium.

-DENTAL WAXI

ENTISTS and dental laboratories use quantities of various wax compounds as: base-plate wax, inlay-casting wax, impression wax compound, set-up-wax, bite wax, sticky wax and carving wax. In the hands of the dentist and of the technician, the dental waxes have to work and serve as ideal plastic materials. They must have high plasticity at normal temperatures, tensile strength, fusibility, hardness, adhesiveness and non-crystallinity. For instance, the requirements for base-plate wax include plasticity, fusibility, hardness, and light colour. Inlay-casting wax must soften without becoming flaky. It must not show appreciable chipping or flaking when trimmed to a fine margin, at room temperature. It should become plastic when heated and harden very quickly when cooled. The melted wax, when vaporized at 500°C. must have no solid residue other than carbon. It must have a certain thermal expansion and flow.

Carving wax should be hard, of very fine grain, and easy to carve. Sticky wax must have good adhesion but should not stick to fingers.

The following formulas are representative of these compounds:-

BASE-PLATE WAX

_		
Paraffin Wax	70	parts.
Beeswax	20	,,
Carnauba Wax**	4	.,
Gum Dammer	6	**
II		
Paraffin Wax	80	parts.
Acrawax C	5	
Rosin	5	.,
Inlay Wax		
Paraffin Wax	18.0	parts.
Carnauba Wax **	3.5	"

Resin *	2.5	Pe
Candelilla Wax	1.0	
STICKY WAX		
Flexowax C	11	
Beeswax	11	
Ozokerite	13	
Venice Turpentine	2	
Carving Wax		
Paraffin Wax	30	1.
Ozokerite	30	
Montan Wax	20	
Carnauba Wax **	20	
* The racin may be a ph	anol n	٠.

- * The resin may be a phenol marketin or a petroleum resin.
- ** Carnauba wax can be replet the synthetic wax Acrawax C.

In all these formulas the resinwaves are being replaced more and by synthetic products, because the sytic materials are free from impowell-defined, and often cheaper than natural products.

METHOD OF PRODUCING BASE PLAI

The resin, which must be very is melted; then the waxes are additional heated till homogeneous. The hot are filtered through a fabric and heated. An oil-soluble dyestuff, problem is added, for coloration and the stirred till completely uniform, again, and poured in flat pans. Also sew days, the cakes are heated in water and milled on a two-roll morolls having the same speed and made of granite or stainless steel. A cooling in cold water, the milled shows are stamped.

-PHARMACEUTICAL RECIPES

EASTON'S SYRUP

Iron	8.6	grms.
Phosphoric acid	40	c. c.
Strychnine hydrochloride	0.3	grms.
Quinine sulphate	14.8	**
Simple syrup	560	C. C.
Glycerin	140	a.
Distilled water to produce	1000	P1

Dilute the phosphoric acid with 80 c.c. of of distilled water; add it to the iron contained at a flask of suitable size, and heat on a waterboth, until the iron is dissolved. Add the solution to the strychnine hydrochloride and the junine sulphate previously triturated with 2 c.c. of distilled water. When solution is omplete make up to 250 c.c. with distilled vater, filter it into the syrup and glycerine, reviously mixed and pass sufficient distilled vater, through the filter to produce the required volume.

SYRUP FERRI IODIDE

Iron, wire, cut into small pieces	12.5 41.5	grms.
Diluted hypophosphorous acid		e. e.
Sugar	575.0	grms.

Distilled water Introduce the iron and iodine into a dask of thin glass and add to it 150 cc. of distilled water. Shake the mixture occasionally, thech tag the reaction by placing the flask in cold vater, and when the solution has acquired a steenish colour and has lost the odour of odine, heat it to boiling; and add at once 50 crams, of the sugar. When this has dissolved, ulter the solution into the remainder of the eagur contained in a porcelain dish. Rinse the lask and iron wire with 125 c.c. of distilled water and pass the washings through the dher into the sugar. Stir the mixture with a lass rod, heating the liquid on a water bath util complete solution is effected and having passed the syrup through a clean muslin strainor into a tared bottle, add the diluted hypophosohorous acid and sufficient distiled water to make the product weigh 100 grams.

CORN SALVE

Salicylic acid	6 dr
Methyl salicylate	2
Wool fat	2
Yellow waz	2
tand (hongosted)	11
Mix all the ingredients	thoroughly in

Mix all the ingredients thoroughly in cortar.

ii tai .

ULCER OINTMENT

Oil of eucalyptus	14	parts
Colophony	20	•9
Soft paraffin	55	- 4
Hard paraffin	11	•
Green colouring matter-trace.		

Mix thoroughly in a procelain mortar and put in printed tin boxes. This preparation will not only be efficacious to ulcers but also to all skin diseases, cuts, bruises, eczema, etc.

BRAHMI OIL

In preparing this medicated oil, sesame oil is generally used. This oil, before being bailed with medicinal substances is first of all heated to deprive it of any water by evaporat big. It is then putified by steeping in it the following subctances for 24 lours viz., madder L 16 part in weacht of oil, turneric, wood of symplocos recemosa, tubers of cyperus rotundus, a book called a taka, the three myretalans, root of payonia adorata and the tender shoots of pandanus odnatissium, each one sixty fourth part in weight of the all. These incredients in tire powder should be soaked in the oil, with the addition of an equal quantity of water for a day. The mixture should be boiled till flor water is evaporated, and finally strained through clean clote. To the oil thus prepared dried brahmi herb is added in the proportion of 4 parts of the heab to 16 parts of oil. The mix ture is then boiled till the watery parts of all evaporated. This is then allowed to cool and strained.

DIGESTIVE POWDER

Chebuile myrobalan	l	part.
Emblic myrobalan	1	
Ajwan	ļ	**
Anisced	1	44
Ginger	ì	10
Rock salt	i	80
Common salt Mrx in tine powder.		
Dose: 1 to 2 teaspoonfuts after	Loc	d.

UNIVERSAL LINIMENT

Oil sassafras	1	dr.	10	drops.
Oil camphor Oil of thyme	24 3 100	dr.		drops.
Methyl salicylate oil ferebinth		02.		

Mix and add colouring matter, if required. This is a good pain relieving liminent.

BISMUTHATED MAGNESIA

Bismuth carbonete	1 02.
cottom blearbunate	5 .
Magnesium carbonate heavy	6 a sufficiency.
Simple syrup	a gamente

Mix to a slightly damp powder, pass through a 20 hole sieve, dry, and compress into 15 grains tablets.

-Recipes for Small Manufacturers

ICE CREAM POWDER

Powdered starch	1	OZ.
Powdered sugar	1	**
Orange dye, sufficiently to tint.		
Essence of almond	10	mins.
Essence of vanilla	10	**

Mix. This quantity is sufficient for a pint milk, with which it is to be mixed, then night to the boil, when cold put in the freezer.

CRYSTALLISED COCONUT CHIPS

Prepare the coconut kernel by passing off brown skin. Cut them in thin slices and ck them in a crystallising tm. Now make aple syrup enough to cover them. Pour this n syrup over them while hot and stand aside · 12 hours, then drain off the superfluous syrup removing the stopper from the tin. Spread) chips on trays and put them in the drying m for 2 or 3 days turning them over at When dry put them again into the .ervals. i; boil a like quantity of syrup as before and it stand till nearly cold; then pour it over and let remain undisturbed for other 12 hours; then strain again and spread em on trays when dry, they are ready for le. This, of course, will be white. To make e chips red simply colour the syrup which used for crystallising.

COLOURING PHOTOGRAPHIC PRINT

Colour finishes of wide variety can easily applied to any photo without toning powders other chemicals. Take photographic or her transparent oil colour and thin it with rpentine to such a consistency that a wad of tton will readily absorb it. Be sure to use thing but turpentine for the thinner. Squeeze t the surplus colour and rub the cotton wad er the print, first lengthwise and then crosses, rubbing the colour into it until the surce is dry.

ARTIFICIAL TEETH

The following is one of the processes adoptor the manufacture of artificial teeth. Pure artz is calcined by a moderate heat. When ken from the fire it is thrown into cold ater, which breaks it into pieces, which are en ground into fine powder. Next fluorspar, so from all impurities, is ground up in like anner into a fine powder.

The next step is to mix together nearly ual parts, by weight of the powdered sparted quartz. This mixture is again ground to a eater fineness. Oxide of tin is now added to for the purpose of producing an appropriate lour and water and china clay to make it astic and give it consistency. This mixture sembles soft paste and is moulded into proper ape. After this, two small platina rivets are serted near the base of the tooth, for the pur-

pose of fastening it to a plate in the mount. They are now transferred to a furnace, when they are "cured," as it is technically called that is, half-baked or hardened. The teeth amow ready to receive enamel consisting ground spar and quartz made into soft past with water, which is evenly spread over the half-backed body of the tooth, by means of a delicate brush. The teeth must be next subjected to an intense heat. They are now put into ovens, lined with platina and heated by furnace, in which the necessary heat is obtained. When properly baked, they are remover from the oven and allowed to cool.

PLAYING CARD VARNISH

Gum elemt		5 6	lbs.
Methylated	spirit	4	gals.

Dissolve. This is a colourless varnisespecially suitable for playing cards. You need not add any other ingredients; if you desire to make a pale varnish for your purpose the proceed as follows:—

Powdered	pale	manilla	copai	28	lbs.
Powdered	rosin			56	**
Methylates	d spir.	it		12	gals.

BRILLIANTINE POMADE

Soft paraffin	940	parts
Beeswax	6 0	- ,,
Patchouli oil	1	part.
Vetivert oil	1	44
Ethyl cinnamate	1	**
Benzyl cinnamate	1	**
Bergamot oil	5	parts.
Rose oil	3	1.0
Balsam of peru	4	**
Musk ketone	4	**

Melt the paraffin and beeswax over wat bath and add the other ingredients. Then b ' in wide mouthed bottles.

ICED TEA

- 1. Prepare brew of hot tea in a teapot of the usual way, using 3 ounces of tea to ongallon of boiling water. If possible use a teapor with a removable infuser and withdraw after minutes, failing this, strain the brewed testinto another pre-heated teapot.
- 2. Prepare a sugar syrup by dissolving granulated sugar in boiling water using approximately 2 pints to 1 lb. of sugar.
- 3. Fill a glass to the brim with small chipped ice.
- 4. Pour hot ten over the ice until glass is almost full.
 - 5. Add sugar syrup.
- Just prior to serving add a wedge of lemon and a prig of mint.
 - 7. Serve with sundac spoon and straws.

-IN THE FIELD OF INVENTION

LECTRONIC INSTRUMENT TUNER

An electronic apparatus to assist in the pid and accurate tuning of pianos and certain her musical instruments has been developed, gas discharge lamp is arranged to flash in acrdance with sound reaching a microphone, and the from this lamp is used to illuminate 12 tating discs. Each disc carries seven strotospic rings of black and white segments, arrangso that each ring has twice as many segents as the preceding one. The twelve discs rrespond to each chromatic now in the seven taves marked on each disc., i.e., there is a tal of 84 notes covered.

EW FUMIGANT KILLS FRUIT FLIES WITHOUT DAMAGE TO COMMODITY

U. S. Agricultural scientists have developed chemical that will kill destructive fruit and getable flies and still not damage the commoy. The chemical is called ethylene dibromide d is used as a fumigant on perishable foods destroy the Oriental fruit fly, the melon fly. d the Mediterranean fruit fly. Fruits and getables sent from Hawaii to the United States ist be certified before shipment. Thus the amodities have to be fumigated with chemiis that will not damage perishable items. centists working at the Hawaiian Agricultural periment Station in co-operation with research orkers in California found that fruits and getables are more tolerant to ethylene dibro de fumigation than to any other treatment sted. The chemical is applied to the commoties at the rate of 1 pound per 2,000 cubic feet space over a two hour period at 70 degrees threnheit. The treatment is for use on peppers, melons, bananas. bell ocados. cumbers, papayas, pine apples, string beans. d squashes.

IBRATING TABLE.

Containers of all shapes, sizes and materials u be effectively vibrated with the Kolt brating Table.

The table is of all-steel construction. The ble top is securely bolted to moulded rubber untings which isolate it from the base, bration is not transmitted to the feet of the whine. An unbalanced weight rotated by a call electric motor causes the vibration. This brator is secured to the table top by special untings to eliminate "contact rattle". The rface of the table is slightly dashed to prevent atainers sliding off, and is covered with felt eliminate noise.

OT AIR OVEN

A new type of hot air oven, designed by ectricals, Ltd., has Just been announced. ifficulty in the past has existed in obtaining

very close temperature control but it is claimed that this oven, by reason of its design and construction, virtually eliminates this trouble.

Temperature range of the oven is up to 300°C, and it can be used for any temperature within these limits—Internal measurements are 17 ins. cube.

A thermostat control gives the desired temperature at all parts of the oven to within 14 per cent with shelves loaded, although the limits are finer than this for any one point. This very close temperature control is obtained by special features, the principles of these being a hot surrounding the interior of the oven, in which the air is circulated by a fan. An additional fan agretes the air in the oven interior. The heat insulation is such that the exterior of the oven remains cools at all times.

Due to the unique air bath principle used, it is possible to avoid switching the whole bank of "lecting elements on and off through the thermostat circuit, a system which invariably gives rise to great fluctuations in the oven itself. The small witther controlled by the thermostat plus the extra clements controlled by a 5 position rolary switch when required to attain high temperature, provides very small temperature fluctuations.

A warning light to indicate failure of the fan, and a pilot light on the thermostat, are nited in the central panel.

The oven is useful for all laboratory purposes and is ideal, by virtue of its temperature control, for the sterilization of syringes, etc. at 165 C.

OII. FOR EGG PRESERVATION

A method of improving egg preservation by oil dipping designed to maintain the general quality of shell eggs is now being applied. Peris carried out with a special grade of oil supplied shell have shown that the treatment with oil of new laid eggs before cold storage maintains their taste and quality for as long as seven months. When are egg is thus treated the porce of the shell are filled with oil, loss of molsture and carbon dioxide is lessened and it becomes difficult for microbes to invade the interior.

—Chemical Ags.

PRESSURISED FIRE EXTINGUISHER

A pressurised extinguisher designed to smother dangerous fires in metals has been developed by the Ansuh Chemicar Co. of Parinetti, Wisconsin. The extinguisher expels a dry powder known is met-X which forms a crust over the metal. It is claimed to be moistune-proof, non-toxic, non-corrosive and non-abrasive. The developes reported to have been effective against fire; in magnesium, sodium, potassium, zinc, and powdered aluminium.

-FORMULAS, PROCESSES & ANSWERS

DHUP

786 H.H.S.C., Choharpur—Wishes to have lormulas of dhup, tooth powder, etc.

In the manufacture of incense sticks, woods and spices are reduced to fine powder. The required amount of these powders are welghed out first and mixed. The mixture is then made nto a thick paste with mucilage of gum acacie or gum tragacanth. The sticks are of bamboo plinters dipped in nitre solution and iried. These splinters are next vertically sunk nto the fumigating paste taken in a wide-nouthed glass cylinder and withdrawn slowly. Observe that the coating is uniform. If not lip it again into the paste. Dry the stick verically. Lastly pack.

Aguru 1 ch.; sandal dust 1 ch.; gugul 1 ch.; assia leaves 1 tola, deodar wood 1 tola; jotanansi 1 tola; costus root ½ ch.; vetivert root 1 ch.; white dammar 2 ch.; nagarmoth 1 tola; ugarcane molasses 1 tola. Mix these ingredients together; add 4 pieces of lakhi and soak or 3 days. Then grind well into paste and nake into incense sticks.

COTH POWDER

Precipitated chalk	35	parts.
Magnesium carbonate	25	**
Borax	14 4	
Sodium bicarbonate	14	
Soap, powdered	4	D
Sugar, powdered	71	
Methyl salicylate	å part.	
Menthol	1/10	71
Cinnamon oil	1/5	

Dissolve the menthol in the methyl salicyate, add the cinnamon oil and then add to orax and mix with sugar. Add to the other agredients; mix and sift.

MITATION TABASHEER

553 P.H.M., Calcutta -Wishes to know a rocess of preparing imitation Tabasheer.

Tabasheer occurs at the nodes of bamboos nd consists largely of hydrated silica. As abasheer is mainly a silica it may be prepart by decomposing silicon tetrachloride with atter or an alkali silicate with acid. When neentrated hydrochloric acid is added to a plution of soluble glass, gelatinous silica separtes. The mass is carefully evaporated and mited, and the silica is thereby rendered include by a process of polymerisation which ecompanies dehydration. The residue is then gested with dilute hydrochloric acid to displye oxide of iron and other impurity, as well sodium chloride, and finally washed with atter, dried and ignited.

AILOR'S CHALK

638 K.N.B., Krishnagar—Wishes to have recipes of tailor's chalk.

WHITE

French chalk	20	parts.
Pipe clay	20	**
White curd soap	6	••
Water, to suit.		

Make into a stiff paste with sufficient water from this form slabs of desired size and presente the oiled wooden or metal moulds. After moulding dry the pieces in a moderately heared place.

YELLOW

<u> </u>		
Chalk powder	28	parts.
Soapstone	18	
Pipe clay	10	
Yellow Ochre	7	,,,
Lemon Chrome Yellow	13	n
Water, to suit.		
Proceed as above.		

BLUB

Chalk	20	parts.
Pipe clay	20	. ,,
Soapstone	15	
Ultramarine blue	10	"
Water, to suit,		
Proceed as above,		

BLACK

Soapstone	56	parts.
Bone black	8	. ,,
Yellow soap	6	,,
Gum arabic	2	11
Glycerin	1	part.

Dissolve the gum in a small quantity water, add glycerin, mix in pigments. The grind to a smooth paste with water and proceed as above.

LANTERN SLIDE INK

An ink consisting of 3 p.c. solution of colubid in "Cellosolve" or other similar solved and coloured sufficiently with crystal violet, wo ther dye, will write on clean glass, using cordinary steel pen. Slides can be very eas a prepared. It is necessary that the glass be usually clean and free from any oil film. The dry glass, after washing with soap and wate should be sponged with acctone, and the stace must not be touched with the hand during the writing. The handle of a tooth-brush satisfactory source of celluloid. The ink direpidly and corrections can be easily madafter erasing by scraping with a razor blade.

BONDED ABRASIVE WHEELS

The use of a good grade of animal had glue is essential. Bone glue, fish glue, and cold glue preparations are relatively insufficient.

Mix by weight only and never heat more than a three hours' supply at any time. For average conditions in the poliching many the

ollowing table of mixtures should act as a hours by washing thoroughly with a mild soap and water. It should not be allowed to get into

Size of grain	% Glue.	% Water.
24-26	50	50
46-54	45	55
6070	40	60
80-90	35	65
100-120	33	67
150-180	30	70
220-240	25	75

Soaking the glue allows it to dissolve more dily on heating. Use pure water and de.

Ground glue - One hour or more.
Flake glue - Six hours or more.
Cake glue - Twelve hours or more.

The glue should be melted in a waterseted heater. When the wheels and grain a preheated, apply the glue at a temperature 110°F. With wheels and grain at room tem undure, use glue at 160°F. Keep a thermofor in the glue pot as a constant check on apperature.

LUEING IRON ARTICLES

884 S., Lucknow Wants to have a recipe blueing iron articles.

Caustic soda	36	OZ,
Litharge	7	,,
Sodium Cyanide	2	**
Lead Acetate	2	.,
Metol	1	**
Water	50	•

Mix all together. Heat the solution to 9-134°C. Immerse the iron article into this dation for 2-4 minutes. Then take it out.

REEN MARKING INK.

Silver nitrate	11	parts
Ammonia solution	22	
* Sodium carbonate	22	••
Water	12	
Gum	50	
Sap green	2	

Dissolve the silver nitrate and the ammo it and the sodium carbonate in the water parately. Boil the latter and pour the silver into into it. Then add the gum and colour it the sap green.

PPECTIVE LICE KILLER

Benzyl benzoate	250	e. c.
Triethanolamine	5	gm.
Oleic acid	20	,,,
Water	750	c. c.
To make about	1000	49

Mix the triethanolamine with the oleic acid, the benzyl benzoate and mix well. Transtill the mixture to a suitable container of about the c.c. capacity, add 250 c.c. of water and blike thoroughly. Finally, add the remainder of the water and shake thoroughly.

This lotion is applied to affected areas and dlowed to dry. It is removed after several

hours by washing thoroughly with a mild soap and water. It should not be allowed to get into the eyes, open cuts or wounds. After its use, comb the hair to remove dead lice and nits.

RAZOR HONE PASTE

929 C.T.C., Mectut -Wishes to have a good formula of razor hone paste.

Fine carborundum powder 6 lbs,
Beef suct (freshly rendered) 2 "
Beeswax yellow 1 lb.

Melt the suct and the wax then incorporate the carborundum powder. Cool and cut into small cubes or put in tin containers while still warm.

ETCHING POWDER FOR IRON AND STEEL

912 PPC, Meetul City Desires to know a process of etching iron and steel.

Blue vitual 50 parts. Common salt 50

Mix and then morstened with water just before application over iron and steel to be etched.

For lustrons figures on a duil ground the whole surface a polished, the portions which are to remain bright covered with stencils and and the object exposed to the fumes of nitric acid. This is nest done by pouring sulphuric acid 20 parts, over common sait 10 parts.

LUMINOUS PAINTS

953 P.N.C., Anakapalle Desires to know process and formulas of preparing luminour paints.

In the manufacture of luminous, pigments the quality and purity of the raw materials are of the greatest importance. The calcium oxide it ed in most luminous pigments is obtained by calcium pure marble or iceland spar. The sulphur used should be recrystallized from carbon bisulphide. Only purest rice starch and not impure potato starch should be used as reducing agent.

LUMINOUS BASE

Calcium oxide	5	g.
Sulphur	10	m
Starch	2	"

This base can be activated with a solution of \(\frac{1}{2} \) per cent thorium nitrate and \(\frac{1}{2} \) per cent. bismuth nitrate in alcohol slightly acidified with nitric acid. One of the fundamental requirements is a good and uniform distribution of the effective heavy metals throughout the whole mass. This is accomplished by grinding thoroughly a portion of the base in the solution and slowly adding more base until all ingredients have been mixed carefully.

The colour of the luminescence can be varied and controlled within wide limits. A blue luminescence is emitted by the following pigment:

Luminous base 15 g.
Potassium sulphate 0.25 ,,
Sodium sulphate 0.25 ,,
Bismuth nitrate solution 0.5 c. c.
Thorium nitrate solution 1.0 ...

This mixture is calcined for fifteen minutes at white heat. The crucible is first charged with a layer of charcoal or coke on which the mixture is pressed and allowed to dry thoroughly. The crucible is then covered with a lid and sealed with a magnesia cement. After calcination is completed the crucible is removed from the furnace and cooled quickly. The resultant luminous pigment should be kept in large pieces in well sealed containers. For incorporation in luminous paints the pigment should be powdered only coarsely since very fine grinding affects luminosity adversely.

The following pigments can be prepared in a similar manner.

YELLOW LUMINOUS PIGMENT

Barium oxide	10	g.
Sulphur	2	
Starch	1	**
Potassium sulphate	0.1	**
Bismuth nitrate solution	0.5	c. c.
Thorium nitrate solution	1,0	**
Calcining time 35 minutes	at white	heat.

GREEN LUMINOUS PIGMENT

strontium oxide	10	g.
Sulphur	8	19
Starch	2	93
Potassium sulphate	0.25	10
Bismuth nitrate solution	0.5	e. e.
Thorium nitrate solution	1.0	**

Other colours can be produced by varying the activating salt. Uranium salts give blue to bluish violet luminescence; cerium salts, reddish-yellow; antimony salts, greenish-yellow; mercury salts, green; manganese sulphide, golden yellow; gold salts, green; copper salts, green; molybdenum sulphide, orange; and lead sulphide, blue-green. Colloidal solutions of metallics or sulphides which can be kept in colloidal solution by the formation of complex salts may also be used as activators.

HAIR CURLING LIQUID

979 P.P.P., Samarkha Wishes to have recipes of hair curling liquid, hair removing lotion, etc.

Glycerine	100	grams.
Sodium sulphite	100	
Water	1000	c. c.
Ammonia (10%) solution	100	grams.

Dissolve the glycerine and the sulphite in the water, and add to this the ammonia solution.

HAIR REMOVING LOTION

Sodium sulphide	14 parts.
Water	160 🙍
Rect. spirit	4
Glycerine	20 "
Lavender oil	1 part.

Dissolve the sulphide in some of the wat add the glycerine and mix. Add the remin of the water and finally the lavender oil, solved in the pirit, mix well and filter.

PAIN BALM

Yellow vaselin	24	OZ.
Methyl salicylate	2	te.
Oil of cajuput	1	90
Oil of eucalyptus	1	,,
Peppermint crystals	1	,,
Wool fat	10	31

Melt the vaselin and wool fat over safer and then remove from the source of sand mix the other ingredients with stin. Continue stirring until the mass is also solidified.

PREPARATION OF PAPAIN

1037 C.F., Vythiri-Desires to know process of preparing papain.

The best method to prepare papain is collect the juice of unripe papaw by mal shallow longitudinal incisions about i inched in the well grown fruits, by means of a metallic knife such as a bone or eborknife.

Fruits in which only three to four incis. are made simultaneously can be incised as after a day or two. The juice resembles a within sticky latex which congulates rapidly

The fruits should be incised in the comorning and the juice strained through neared dited at about 35°C for two days, who forms a cream coloured brittle mass with unpleasant odour. The mass can be ground a powder.

The juice should be collected in g' earthenware and a trace of formalin add-t the jnice which will prevent decompos . Small quantities of juice may be dried a sun on sheets of glass. Large quantities is ever are prepared preferably by spreading juice on linen trays made by stretching bear linen on wooden frames placed over a bechamber of bricks avoiding excessive For this purpose an iron plate covered 2 to 3 inches of sand between the fire and hot air chamber of bricks avoiding exceheat. For this purpose an iron plate covwith 2 to 3 inches of sand between the fire the hot air chamber may be used with the t. about one foot above the plate.

Artificial dyeing in this way should be a below 100°C. On a large scale however, was drying would be found to be very efficient a juice contracts in drying and the contents several trays can be placed subsequently into complete the drying. The juice should dried till it is crisp and capable of being reduced.

the juice.

After drying the mass is ground, while still arm in a stone mortar with a stone pestle. he crude product is a white amorphous powder. order to purify this impure substance, it is ated with a sufficient quantity of absolute cohol and it is found that about 75 per cent. the crude mass is dissolved in it. It is then tered and the filterate on evaporation gives so to pure substance; which can be used again.

AMARIND SEED KERNEL FOR TEXTILE IZING.

1048 K.H.K., Bombay-Wants to have a wess of extracting tamarind seed powder for dile sizing.

The curtailment of starches made from food educts created the textile industry's interest mew sizing materials. Since fruit pectin is a obtainable either, another kind of pectin ide from tamarind seeds has bright prospects, is disposed of as a waste material. Tamarind ed is a rich source of pectin for various indusial applications. It constitutes a highly viscous dution in water and additions of borax have in found to appreciably increase its viscositi. ed to effect formation of a water-holding gel-'ese properties approximate the qualities of um tragacanth and tragasol, and in the fabri ction of rubber the new pectin is already being inloved as an equal replacement for these ibstances. As a sizing material for textiles. is superior to gum karava and preferably mal to starch. In consideration of the reasonde price, it can be expected to become a manent.

The sizing material is prepared by heating e seed to 150°C for about 15 minutes, soaking the decorticated kernels in water, and drying em for powdering. Instead of the 7.5 per cent dution employed where tapioca starch is used 5 per cent, solution of the tamarind sizing owder can be recommended for correct visco-.ty and consistency.

ERMILION

1058 D., Kanpur--Wishes to have good rmula of vermilion.

Red lead lbs. 5 Zinc oxide 1 1h. Venetian red 49 lbs. Vermilion dye

Macerate these ingredients thoroughly in a one mortar and set aside for 24 hours in a ool place. Finally reduce it to fine powder ad pack.

COLOURED CHALK CRAYONS

1100 P.P.W., Masulipatam - Desires to now formulas of coloured chalk crayons.

WHITE

Precipitated chalk 40 parts. Plaster of Paris 45

Lithophone Glue solution

10 parts. 5.10

Knead all together to make a soft dough and pour into gun metal moulds. When set take out and allow to dry in air. Then put all together in a tray and moderately bake over mild fire.

BLACK

Scapstone	28	lbs.
Gypsum	20	
Pone Black	8	,,

Mix and make into a stiff paste, with thin glue or gum, mould and dry gradually.

YELLOW

28 1bs.
18
10
63
" " "

First well mix othre and chrome, then add to others, making a paste as before.

BLUM

Soapstone	15	Ibs.
Gypsum	15	4.0
Chinese blue	11	.,
Proceed as before	-•	"

Gerra

Gypsum	35	lbs.
Soapstone	25	19
Pipe clay	30	10
Lemon chrome yellow	7	12
Chanese blue	6	

MI: Chinese blue and chrome together; add to others, making and moulding as previously.

Ren

Whiting	15	Ibя
Soapstone	28	
Pipeelay	10	710
Indiau red	7	11
Venetian red	11	13
Proceed as before.		

THINNERS FOR CELLULOSE LACQUERS.

1133 C.R.R., Bangalore Wants to have good formulas of thinners for cellulose lacquers, hydraulic brake fluid, etc.

Acetone	8	parts.
Ethyl acetate	2	**
Ethyl lactate	2	
Mix in a well stoppered bottle.		

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"Greaseproof paper hags for wafers and massalas, and Sulphite paper bags for tea coffee, distemper and other industries, made to your sizes."

DARASHAW 2 24, Jambulwadi, Bombay 2.

-READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who j specially adept in dealing with such problems and to whom experiences of a large ninihe of successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available, his replies will lead the enquirer to a successful businessmen are available.

STARTING A CAREER WITH SMALL CAPITAL

869 R., Agra—Writes, "I am keen after starting some industry but I have neither capital nor experience. So please advise me accordingly."

It is very difficult on our part to suggest any kind of industry which can be started without any capital. You may however start some mail order business which can be started with small capital and can be worked in leisure time. This business will not yield you any profit in the first two years. In course of these two years you will get experiences that wil be of much help in successive years of your business career. The first atempt that you should make is in marketing some cheap novelties. The large houses do not usually handle such things. So there is not much danger of coming in contact with the class. The most dangerous competition will in probability come from your rival, the small mail order class, the number of which is very limited. But if you are very keen upon starting any kind of small industry you may take up manufacture of ink. Process of manufacturing all sorts of ink will be found in Manufacture of Ink, published from this office, price Rs. 3/7/- including postage.

MAKING MONEY IN A SHOP

1148 S.C.B.R., Madras - Wishes to be enlightened on how to make money in a shop. The most important factor about making money happily fn your shop is your attitude towards it. Too many people enter shop life because they think it is an easy way of making money. You buy goods at one price and sell them at another, and the balance is profit.

HARIKUME'S Hosiery Needles

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la in continue de la continue de la

Grams:
Olddawn.

Phone: 9 B. B. 514 & 5755. Actually, making money happily in a shop j one of the hardest ways of choosing a $v_{\rm type}$ but it is also one of the most interesting $v_{\rm type}$.

The fascination of meeting a lot of proper of building up your shop sales, of struggly promaster and come out on top of a thousand on one problems that beset the average to keeper, is perhaps the main reason for successing a shop.

The second reason for success in a sleen understanding your public. It takes pluck buy, and it takes skill to buy the right proof Wrong buying kills the shop at birth a successful shops are built up by skilful, plack buying and thousands fail because of the fail to accept this first fact.

Some people think buying is a gift-ontwardly it is, but I have never met a skilful buyon who is not a master of his line, and his published. This skill was not gifted at birth has been built up by long study, careful analysise observation and a ready willingness all times to recognise mistakes one of the nodificult things to bring oneself to do in a steel

The third reason for success in a shep a desire to grow. Folk who start a shop is heaven, generally make it a cemetary whethey bury their tendest hopes. As you wread, there are many ways to grow, as lone you will grow. On the law of average ye shop is but your lengthened shadow. As we grow inside, the evidence in outward visible.

Making a shop pay is a full and absorbed task, for to make it more, calls for hard their ing allied to hardwork. Successful shops performed when they reflect prosperity. Even if ware having a bad time, begin to think good take the toutside your shop the first opportunity ask yourself "Does my shop radiate perity?" Because although the public ought help the shop that needs help the most generally patronises the shop that look-though the shop confers the favour by her open.

Make your shop look what you want it be. Remember, the onus is on you and not the customer, If the customer does not the customer, If the customer does not the with you as you want him to deal, it is be fault. Make your store active, prosperous a good-looking. Show movement and vitable If necessary paint up and clean up. Dewindows more often; send out more sample Have competitions among the salesmen. I something to let the public know you a moving.

-BRIEF QUERIES AND REPLIES

[Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt or As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.]

901 A.N.V., Ludhiana — Plastic powder pay be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

902 K.L.G., Bilaspur --Refer your query to The Controller of Exports, New Delhi.

908 M.A., Hyderabad.—We have no book on synthetic perfume manufacture. You better try at Thaker Spink & Co. (1933) Ltd., 3, I'splanade East, Calcutta.

909 K.S.N., Trichur -An article on ink manufacture appeared in April, 1950 issue of industry. We have also a book Manufacture of Ink, price Rs 3/9/- including postage.

911 C.F.W., Wattala Fancy tin cans may be had of Bengal Tin Box Mnfg, Co. 1, Jadu Nath Mitter Lane; National Sheet & Metal Works Ltd., 36A, Sabitya Parishad Street and Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur; all of Calcutta.

913 LX.P., Chilaw Optical goods may be had of Eastern Optical & Co., 306, Bow Bazar Street; Geneva-Optics & Co., 5, Bow Bazar Street; James Marray & Co. Ltd., 5, Old Court House Street; and New Indian Optical Co., 257 3, Bow Bazar Street; all of Calcutts. There is no institute that teachles optician's course by correspondence,

915 S.H.J., Farrukhabad You may add the powder to the oil and stir vigorously, let the oil settle completely for 21 hours. Now decant the oil and filter.

917 M.S., Gauhati - You should make arrangement for vacuum packing of fish pickles to prevent fungus. For preserving lemon juice you may use potassium metabisulphite in the proportion of 1 part in 1000 parts of lemon juice.

918 M.P.D., Bishnubur -- For rope and string making machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission low Extension, Calcutta 1.

920 S.V.K., Hubli — Cigarette making teachines may be had of Small Machineries Mufg. Co., 22, R. G. Kar Road, Calcutta.

922 J.P.S., Moradabad--You may consult liastic Industry published from this office. brice Re. 1/8/- including postage. Plastic tould may be had of Francis Klein & Co. Ltd. 1, Royal Exchange Place and Alfred Herbert (India) Ltd., 13/3, Strand Road; both of Calcutta. Moulding powder may be had of imperial Chemical Industries (India) Ltd., 18. Strand Road, Calcutta.

923 P.G.M., Cachar—Motor accessories may be had of Howrah Motor Co. Ltd., Mission Row Extension, Calcutta; Premier Automobile Ltd., Construction House, Ballard Estate, Bombay and Standard Auto Parts Co., 2-30, Mount Road, Madras. Tarpaulin may be had of Asher & Co., Vadgadi, Bombay; Manton & Martin, 70, Netaji

Subhas Road, Calcutta and Roberts McLean & Co. Ltd., 31, Nataji Subhas Road, Calcutta.

924 D.A., Wai For wood working machines enquire of Alfred Herbert (India, Ltd., 13/3, Strand Road and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; both of Calcutta, Colour may be hat of Imperial Chemical Industries (India) Ltd. 18, Strand Road, Calcutta. Yes, you may use deadar wood for making toys. You may starthis business with Rs, 5000 as initial capital.

925 S.C., Cannanore For Income The Manual against of Thacker Suink & Co. (1933) Ltd. 3, Esphanade East, Calcutta.

926 C.M.V. Baroda Carnauba wax, shellac wax, etc. may be had of Calcutta Chemical Co Ltd., 10. Boutleld Lane and Banshidhar Dutt 126, Kengrapatty Street; both of Calcutta,

927 M.M.D., Cancalore Refer your query to British Trade Commessioner, 1, Harringtor Street, Calcutta,

929 CM.1., Alwar-No such institution: are available.

929 G. T. C. Meernt. Process of manufacturing, sharpening whet stone will appear in due course.

932 R.J.C.F., Udaipur Ail the ingredient, may be had of Banshidhar Dutt, 126, Khengra party Street, Calcutta.

936 J.S.P., Arcot -We are not aware of thouse of formalin in paper manufacture. For p. of paper enquire of Photographic stores & Azenev Co. Ltd., 151, Dharamtala Street Calcutta.

937 S.K.D., Gauhati Battery acid used it storage batteries is diluted sulphurle acid, B. mixing one pint of pure sulphurle acid with 4 pints of distilled water dilute sulphurle acid of 1200 sp. gravity is obtained which may bused as battery acid. Umbrella lendle making machine is not available

939 S.C.V., Shivpurl We are not awar of the particular of sitawara.

941 MB.P., Saharaupur-Following is formula of iron state coating? First preparties silicate solution by finely crussing equaparts of solid potash and soda silicate ampouring over this 6 times the quantity of sof river water, which is kept boiling for about

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1, Jahar Lali Dutt Lane, Calcutta.

He hours, whereby the silicate is completely dissolved. Next take 7 parts of slate finely ground with a little water into impalpable dust and mix with 1 part lamp black. Grind enough of this mass with the previously prepared silicate solution as is necessary for a thick or thin coating.

942 P.P.C., Meerut City—We have no book on tin printing. Process of etching steel

will appear in due course.

943 M.I., Charkhasi--We are not aware of any institution where training is given on cinematography

945 A.B., Barajamda For paper pin making machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

948 S.I.E., Ottapalam -Particulars regarding glass electrodes are not available Process of manufacturing rubber stamp will be found in Manufacture of Rubber Goods published from this office, price Rs. 3/9/- including postage.

952 L.R., Bhadrak-Following is a recipe of vermilion or sindur: Red lead 8 lbs; Zinc oxide 5 lbs.; Venetian red 1 lb.; Vermilion dye 2 lbs. Macerate these ingredients thoroughly in a stone mortar and set aside for 24 hours in a cool place. Finally reduce it to fine powder and pack.

953 P.N.C., Anakapalle -Process of manufacturing luminous paint will appear in an

early issue of Industry,

954 B.R R., Anakapalle—Process of making neon glow sign will appear in an early issue of Industry.

955 R.K.P., Lucknow-Process of manu facturing rose water will appear in due course.

963 S.N.G., Calcutta- For machine parts and other appliances of required design write to Industrial Machine & Tool Manufacturing Co., 41, Panchanantola Road, Howrah.

964 H.S.D., Bhusawal—Case hardening compound is used for hardening steel or other metals. In case hardening certain articles it is sometimes necessary or desirable to leave spots or sections in the original soft uncarbonised condition while the remainder is carbonised and hardened.

967 B.N.O., Rajkot—Process of preparing ghee will be found in Milk and Milk Products published from this office, price Rs. 3/9/including postage. You should arrange for vacuum packing of ghee.

973 B.N.S., Moradabad—For Derby tickets write to The Secretary, Royal Calcutta Turf Club, 11, Russel Street, Calcutta.

TRADE MARKS & PATENTS

For any difficulty in registration of trade marks & patents in India or abroad Consult:

DEWAN RAJ KUMAR,

Trade Marks & Patents Attorney,
78, Podar Chambers, Fort, Bombay.

Phone: 32444. Note: Head office of Trade Marks Registry for India is in Bombay.

974 S.K.M., Bombay-You have to varnish to leather. A formula of leather nish is given below: An excellent varnish leather can be made from the following rec Heat 400 lbs. of boiled linseed oil to 212°F add little by little 2 lbs, of bichromatipotash, keeping the same temperature, addition of the bichromate should about 15 minutes. Raise to 310°F and gradually during 1 hour at that temperatur ibs. of prussian blue. Heat for 3 hours n gradually raising to 482° to 572°F with cons stirring. In the meantime heat together 392'F for 1 an hour, 25 lbs linseed oil, 35 copal, 75 lbs. turpentine and 7 lbs. cerc-Mix the two varnishes and dilute, if neceswhen cold with turpentine. The varnish quire to be warmed for easy application the brush.

976 I.I.D., Calcutta—Following is a liturpentine and rosin manufacturers: Bhag Rosin & Turpentine Factory, Bhagwan Road, Hosbiarpur; Himalaya Rosin & Turtine Mfg. Co., Rikhikesh, Dehra Dun; NathRosin & Turpentine Mfg. Co., 27, Baran Ghosh Street, Calcutta and Soni Rosin Fact Bharwain Road, Hoshiarpur.

979 P.L.P., Samarkha Formulas of curling liquid, pain balm and depilatory be will appear in due course.

980 M.P.P.C., Bhilwara Reply to query appears in June issue under No. 59.

983 S.K.K., Ludhiana -For power leenquire of the following firms: Brita Engineering Co. Ltd., 28, Dalhousie Squalcutta; Imperial Engineering & Text 67 B, Netaji Subhas Road, Calcutta and Hinthan Loom Co. Ltd., 5, Bank Street, 1 Hombay

984 K.M.R., Bhagalpur—It is very diff on our part to suggest names of firms interin dry chhana to be used in manufacturasein.

985 U.P.T., Moulmeingyun--In; order produce pale colour you should mix a s

quantity of tannin.

988 R.G.P., Sabarmati—Glass bottles be had of Victoria Glass Works, 130, Med Bazar Street; Krishna Glass & Silicate Woldtd., 17, Radha Bazar Street, and Jayanti Works Ltd., 8, Ezra Street; all of Cale For labels and perfumes enquire of F N, Su 37, Canning Street; Paradise Perfumery Ib 7, Colootola Street and Sikri & Co., 55, Can Street; all of Calcutta.

990 A.C.R., Madura—Following is a mula of French polish: Shellac 4 oz.; Sand 1 oz.; Sand 4 oz.; Methylated spirit 2 Powder the sandarac and shellac, mix with sand, and dissolve in the spirit. Decant clear portion and filter the remainder

991 U.P., Palasbarl—We cannot vouel opinion regarding financial position and retability of any individual firm.

992 S.L.V., Sujanpur—For soda w making machines enquire of Essence & B Supply Agency, 14, Radha Bazar Street Oriental Traders, 5, Ezra Street; both Calcutta. 993 N.R.R., Ipurupalem—Your letter is unintelligible.

994 R.C.C., Jaora—For paper toys write Depin Behary Dass & Grandson, 63F & C., Radha Bazar Street, Calcutta.; Doll, Dummy A Toy Manufacturing Co., 27, South End Park, Batlygunge, Calcutta, and Fancy Toy Works, Outside Dariba Kalan, Delhi and Hari Charan Pass & Co., 63H, Radha Bazar Street, Calcutta.

996 H.N.B., Kamrup—Following is a formula of chalk crayons: Precipitated chalk 40 perts; Plaster of Paris 45 parts; Lithopone 10 perts; Glue solution 5-10 parts. Knead all excher to make a soft dough and pour into around metal moulds. When set take out and arlow to dry in air. Then put all together in a tray and moderately bake over mild fire.

997 K.K.D., Kanpur—No such herb is available. Braying is making paste with the addition of water. Seeds should be removed. Process should be continued for 6 months, treating each batch of oil for one month.

998 M.M.II., Olavakkot—For grinding machine enquire of Industrial Machine & Tool Minfg. Co., 41, Panchanoutota Road, Howrah and Oriental Machinery Supplying Agency Ltd. P12, Mission Row Extension, Calcutta.

999 C.L.A., Indore—Electroplating appliances and raw materials may be had of S. Mitra X. Co., 30, Bentinek Street, Calcutta; Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta and P. Orr & Sons, Mount Road, Madras.

1002 D.K., Bombay First of all apply a coating of shellac variash then set cork that to the cap by means of pressure.

1003 BA.P., Madras All the addresses to require will be found in Industry Year Book A Directory, published from this office, price 3: 16/4/- including postage.

1006 I.S., New Delhi Sewing machines manufactured by Jay Engineering Worls. Ltd. 183, Prince Anwarshah Road, Dhakuro, Cleutta and K. C. Mullick & Sons Ltd., 7743, boarantala Street, Calcutta You may try to an apprentice in one of the above factories of will require at least Rs. 10 lakhs for starting ewing machine manufacturing concern.

1007 J.C.A., Kalimati For Larometer in the of the following firms: Adair Dutt & C. 1/1. Stephen House, 5, Dalhousie Square, Easi Celeutta; Bengal Apparatus Manufacturing Co., I Hadanga Junetion Road, and Indian Scientistores, 14/2. Old China Bazar Street; all a Calcutin. Glass syringe may be had of Scientific Glass Apparatus Co., 5A, Prosanne is mar Tagore Street, Calcutta and Scientific Scientistores Co. (Bengal) Ltd., C37-3, College Street, Moket, Calcutta.

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1009 J.P.M., Moradabad.—You may take up manufacture of Zarda, Surti and Kimam which may be started on home industry basis with Rs. 2000/-. You may also start shoe lace manufacture. Process of making zarda, surti and kimam will be found in Indian Tobacco and its Preparations published from this office, price Rs. 3/9/- including postage.

1010 A.N.S., Datca—An article on snuff manufacture appeared in April, 1950, issue of industry. If you go through the article you will get all the information regarding snuff manufacture.

1011 BOH., Calcutta Process of manufacturing Zylonite sheet will appear in due course.

1015 D.P., Monghyr--We are not aware of Materia Medica in Hindi. You may however enquire of the following booksellers: --Educational Book Depot, Katra Road, Allahabad and R. S. Ram Dayal Asarwala, 216, Katra, Allahabad.

1016 SSC., Kakinada Silicate of soda may be had of Calcutta Mineral Supply Co. Ltd., 31. Jackson Lane: Puniab Silicate Works, 28, Bagmari Road and Raj Silicate & Chemical Co., 26. Burtolla Street; all of Calcutta.

1017 V.D., Anakapalli Process of manufacturing batteries will be found in Manufacture of Batteries published from this office, price Rs. 3/9/- including postage.

1021 B.L., Salem Process of manufacturing lac or shellac appeared in May, 1951, issue of Industry. Seed lac is known as raw lac as obtained from branches of trees. Shellac is manufactured from seed lac.

1922 H.F.W., Rajasthan -Following is a list of cycle parts and accessories manufacture at Hindusthan Bicycle Manufacturing & Infection Ltd., Phulwari Sharif, Phula, India Cycle Manufacturing Co. Ltd., 9, Thigala Road, Calcutta and Sen Raleigh Industries of Infection, Ltd., Mercantile Bldg., Lall Bazar, Calcutta

NRLE, Kanpur Printed fin cans 1923 may be had of Metal Box Co, of India Ltd., B-2, 1166 Rood, Kidderbur, Calcutta and National short and Metal Works Ltd., 36A, Sahitva Larishad Street Calcutta. Plastic machine Lid., 1, or to had of Francis Klein & Co. Boyal Eschange Places and Herbert Affred (finder) Ltd., 13.3, Strand Road; both of Calcutta.

1024 S.D., Calcutta Following is a list of herb dealers of Kashnir Fairways. Post Box 51, Srinagar and Kashmir Herbal Cottage, 7th Bridge, Sarui Safa Kadal, Srinagar.

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1026 P.C.S., Miraj—For rivets enquire of the following firms: A. M. Mullick & Co., Guptu Mansion, 85A, Netaji Subhas Road; Indestro (India) Agency, 38, Netaji Subhas Road; Lallubhai Amin Chand, 554, Kansara Chawl, Bombay; Modern Engineering Works, 12, Jadu Pandit Road, Beadon Street, Calcutta; Rayes Agency, 20, Strand Road, Calcutta and U. N. Ghose & Co., 61, Netaji Subhas Road, Calcutta.

1028 C.C.L., Kakinada—Following is a list of porcelain factories: Bengal Porcelain Co. Ltd., 3. Moti Seal Street, Calcutta; Calcutta Potteries Ltd., 8, Lyons Range, Calcutta; Bengal Potteries Ltd., 45, Tangra Road, Calcutta Gwalior Potteries, Gwalior; Perfect Pottery Co., 3-24, Thambu Chetty Street, Madras and M. Roben & Co., 14-2, Old China Bazar Street, Calcutta, You may negotiate with the above firms for your requirement.

1031 P.V.K., Madras—It is not possible to detect adulteration of coconut oil without

chemical analysis.

1034 P.N.R., Karaikudi-Refer your query to The Consul General for Belgium, "Morena," 11, Carmichael Road, Bombay.

1035 H.P.B.S., Dhoraji—For selling clay you may negotiate with the following Clay Modellers: Aswini Kumar Paul, Krishnagar; Bholaram, Kanda Bazar, Taketgani, Lucknow; N. C. Paul & Sons, 267, Upper Chitpur Road, Calcutta and Ramesh Studio, 2, Raja Naba Krishna Street, Calcutta.

1036 P.C.W., Ludhiana Inform us that Hindi equivalent of pyrethri is Akarkara.

1037 C.T., Vythiri-Process of manufactur-

ing papain will appear in due course.

1038 D., Kanpur—Process of manufacturlng vermilion will appear in due course.

1039 F.C.P., Shikohabad Hindi equivalent of pyrethri is Akarkara.

1044 R.L.S., Jullundur--You may use benzoic acid for preserving syrup in the propor tion of 1 part of the acid in 1000 parts of sugar used in making syrup.

1046 L.S.C.R., Bhadrak.—For taking agency of cigarettes you may negotiate with the following firms: Imperial Tobacco Co. of India Ltd., Virginia House, 7, Chowringhee Road, Calcutta; Mohammed Usuf, 59, Canning Street, Calcutta and National Tobacco Co. of India Ltd., Agarpara, 24-Parganas.

1048 K.H.K., Kalyan Camp - Process of manufacturing starch from tamarind seeds will appear in due course.

1049 M.S., Kanpur—Process of manufacturing sodium sulphate will be found in any book on chemistry.

1050 R.K.B., Bhilsa-Following is a list of cutlery dealers: H. Baker & Co. Inc., 161, Duane Street, New York 7, U.S.A.; Imperial Laternational Corporation, 1776, Broadway, New York 19, U.S.A.; A. M. Goonda & Sons, 58, 25th street, Rangoon; B. C. Shah & Co. 53-58, Moghul St. Rangoon and Mg Ba Tin Bros., 535, Dathousja Street, Rangoon. Following is a list of piece. goods dealers: Abdul Gani Ahmed, 6266 Edward Street, Rangoon; Noor Mohamed Have Mohamed & Co., 20, Edward Street, Rareson; Allied Universal Ltd., 39, Costland Street New York, 7, U.S.A. and Leona Fabrics Co., 300 Broadway, New York 13, U.S.A. Followers a list of dealers in pharmaceutical preparations E. Foundera & Co. Inc., 75, Warick Street, New York 13, U.S.A; European Chemical Co Pac-366, Broadway, New York 13, U.S.A.; Carried Pharmacy, 108, Moghul Street, Rangoon, G. Pharmacy, 438-44, Moghul Street, Rangoon and Burma Pharmacy, 372, Moghul Street, Rapenco

1051 A.V.A.C.F.C., Coimbatore Following is a list of rich men of India: Ghanshyanelus Birla, 8, Royal Exchange Place, Calcutta; Ara Khan, Aga Hall, Bombay; Tyebhoy Ab fool Kader, Nagdevi Street, Bombay 3; Rai Bahadur Chandumal Balchand, Mount Road, Coonoor Sir Vithal Narayan Chandra Varker, 41, Pedfor Road, Cumballa Hill, Bombay; Sir Ardeshor Rustomii Dalah, Bombay House, Bombay; Sirh Ram Krishna Dalmia, Dalmia Jain Nivas, Now Delhi; Rai Bahadur Sir Badridas Goenka Navas, 19, Belvedere Road, Alipore, Calcutta; Bimaha Churn Law, 43, Kailash Bose Street, Calcutta and Brij Mohan Krishanlal Maroo, 158, 164, Kalbadevi Road, Bombay.

1052 H.S.S., Bellary For cinema slides enquire of The Symposium Publicity & Projet ganda Service, 22, R. G. Kar Road, Calcutta

1051 G.S.P., Berhampur—You may con standian Textile Journal, Surya Mahal, Military Square, Fort, Bombay. For canvas enquire of Adhikary & Co., 21A, Canning Street; Danded lap Dealers Ltd., P23 & 24, Radha Bazar st., both of Calcutta. Following is a list of close dealers: Bombay Cloth Market Ltd., 13, Princess St., Bombay; Jethabhai Ramdas & Co. Mulji Jetha Market, Bombay; Mahadyal Preferend, 187, Harrison Road and Modern Chall Stores, 209, Harrison Road; last two are of Calcutta. Following is a list of hosiery deale.

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MANUFACTURE OF SCHOOL SLATE

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Stradim Bros., 25. Zakaria Street; Bengal acty. 31-32-33, Chandney Chowk and Akshoy acty. 40 For umbrellas write to Akshoy acty. 40 Paul, 112, Khengrapatty ... Street; acty. 49B, Harrison d. and Nundo Lal Paul & Co., 125 & 126, Chem Bazar Street; all of Calcutta.

1 B Y.V.R., Amalapuram — Address of class Works is 147/B, Raja Dinendra Class Colcutta, Address of Bharat Glass Ltd. is Belgharia, W. Bengal.

tot U.C.T., Agra — A good formula of their oil appeared in March, 1951, issue their year. In this connection you may confind an Perfumes, Essences and Hair Oil; tend from this office, price Rs. 1,9/10 agg postage.

and Road; both of Calcutta.

1967 D.G.P., Lashkar Vernacular equits of the ingredients are not available, wood, brazil wood, resin etc., may be had caushidhar Dutt, 126, Khengrapatty Street, entra. Carmine may be had of Fuzlehussein Edos., 44, Armenian Street, Calcutta. Rosin and rosin soap may be had of Calcutta nical Co. Ltd., 10, Bonfield Lane, Calcutta to68 W.U.H., Partalgarh.—Chemicals may had of Calcutta Chemical Co. Ltd., 10, Bonfield Calcutta Mineral Supply Co. Ltd., 31, Jackson et Calcutta. Dyes may be had of Fuzlehusia & Bros., 14, Armenian Street and Champalad u wala, 45, Armenian Street; both of Calcutta.

1970 P.B., Hyderabad An article on nufacture of sizing from tamarind seed nel appeared in March, 1951, issue of Indus-

For grinding machine enquire of Balmer vrie & Co. Ltd., 103, Netaji Subhas Road I T. E. Thomson & Co. Ltd., 9A, Esplanade 1; both of Calcutta. Process of sizing articles it will appear in due course.

1071 M.H.W., Rajkot. We have no book working of a hosiery machine. You better gire of Thacker Spink & Co. (1933), Ltd., 3, lande East, Calcutta.

1072 A.J.M., Wadakanchery — You may all Modern Pottery Manufacture by H. N. osh published by Ceramic Publishing Co., 1. orth Road, Bhagalpur.

1073 C.S.M.L., Kanpur -Following is a list saterproof manufacturers: Bengal Water of Works (1940) Ltd., 32, Theatre Road, utta and India Waterproofing Co., Hasan mbers, Corner of Parsee Bazar Street and ga Street, Bombay.

1074 T.R.C., Indicre City-For particulars of agents of Tata Fon & Steel Co. Ltd., 102, Notagi Subhas Road, Calcutta write direct.

1975 R. J. P. Abmediagar -- Process of manufacturing macaroni will appear in due

1076 G.V.R., Voltanagrum-Plastic machine may be had of Alfred Herbert (India) Ltd., 1792, Strand Road, and Francis Klein & Co. Ltd., I, Royal Exchrusco Place; both of Calcutta.

1977 M.C.J., Annoba, For plastic cases enquire of Popular Plestic Products, 4. Upper Chipore Road, Calcatta; Phoomi Mat Dharam Fee, Chaori Bazar, belbi and Popular Plastics, Ruby House, Opp. Colaba, Tram Terminus, Pero to 5 Glass Phoels may be had of Balsukh Glass Works, 7, Swallow Lane; Economic Glass House, 25A, Swallow Lane and Hind Glass Works, 1 d., 15, Chibaranjan Avenue; all of Calcutta.

10% & J.K., Kottayam - For asphalt compare of Universal Asphalt Products & Construction Co. Ltd., Citadelle, Queens Road, Bombay and Standard Vacuum Oil Co., Imperial Chambers, Wilson Rd., Ballard Estate, Bombay.

1079 P.P.N., Chittoor Mira products may be had of Mira Chendeal Industries Ltd., 11A, Prince Anwar Shah Road, Tollygunge, Calcutta.

1083 H.S.S., Gariana.-For lottery tickets enquire of Royal Calcutta Turf Club, 12, Russel St., Calcutta.

1084 K., Moradatad -- An article on gilding appeared in October, 1950, issue of Industry. If you go through the article you will get detailed into cention about gilding.

1986 MA, Madras — You perhaps mean fountain pen ink. Formulas of good fountain pen ink will be found in April, 1950, issue of Industry. Following is a list of fountain pen ink manufacturers: "Sulckha Works Ltd., Lidaypur, Calcutta 22; J. B. Dutt & Co., 167, 191d China Bazar Street, Calcutta; P. M. Bagchi & Co., 19, Gulu Ostagar Lane, Calcutta; Viswa Sambhar Products, 5, Tobin Road, Calcutta 35, and Skolar Ink Company, 14-2, Old China Bazar Street, Calcutta.

1087 CMM.C., Pombay -A formula of good snow appeared in April, 1950, issue of ledustry.

plants enquire of American Refrigerator Co., 69. Dharamtala Street; Brittsh Refrigerations, 30A. Chowninghee Road; F. & C. Osler Lid., 12, Old Court House Street; M. S. Vernal & Co., Bharat Insurance Bldg., Chittaranjan Avenue South and Refrigerators (India) Lid., 59C. Park Street; all of Calcutta Instructions regarding working the plants will be supplied by

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fransformations that take place in the individual. A new mental phase develops at the age of thirteen. The book makes an interesting study of the changes of mentality taking place in the child and advocates a new system of education which will allow the children to develop normally. The book is a fine exposition of Montessori system of education which is getting popular all over the world and as such should merit careful perusal by teachers of boys and parents as well.

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NOTICES & REVIEWS

(Manufacturers: sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

NOVEL WOODWORKING MACHINERY

The pressing need of India to-day is after the food problem—the housing problem. Man wants to build his house in the shortest time, at the cheapest cost with greatest convenience It is only ingenious machines that can do the transformation of the rough trees into fine building materials in no time.

The well-known South-Indian Industrialist Mr. G. D. Naidu managed to get a complete set of the FESTO Woodworking Machines to India during his last tour to Germany. The FESTO Machines exhibiting the great German technique will be a boon to the industrialists.

Mr. Kurt Stoll, the son of the manufacturer of these machines is also on a holiday trip in Coimbatore, and is demonstrating the machine, at the Industrial Educational Exhibition in Gopal Bagh, Coimbatore sponsored by Mr. G. D. Naidu.

A list of the machines whose advertisement is appearing elsewhere in this issue is given below:

FESTO Chain Saw for Felling Trees and for Cutting to length. Available either with electric motor or with petrol engine for taking out to the forest where no current is available. The outstanding feature of these machines is the extreme casy manipulation.

FESTO Parallel Saw for all kinds of cutting wood up to eight inches cutting depth: cutting to length, angle cutting, cutting rafters, edging, knowlng etc.

FESTO Universal Carpentry Machine auother useful machine for house construction: for mortising, drilling, milling string boards, pointing dowels, grinding etc.

FESTO Universal Planing Machine for Carpentry Work which saves very much time and gives you a smooth and clean surface: for planing, surfacing, grinding, milling, sawing, boring etc.

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FESTO Electric Hand Circular Saw from which two different sizes are available; one up to 31 inches cutting depth and another one up to 6 inches cutting depth. Both can be used portable or as an ordinary stationary table saw.

FESTO Motor Disc Sander which helps y_0 in doing all kinds of sanding and finishing $j_0\beta_0$ More than 10,000 in use are working to the $j_0\beta_0$ satisfaction of their users.

FESTO Chain Mortising Machine making the joints for doors, windows, chatables etc. with built-in switch and only every working lever.

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FESTO Shutter Grooving Machines making all kinds of grooves.

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All these woodworking machines are available in India.

FOUNTAIN PEN INK AND DENTAL FLUID

We have received from S. N. Tenell, Shi habad, one phial Free-Flow ink which is four to be satisfactory.

We have also received from them one proof Tenell's Dental fluid, said to be a germical preparation, which prevents pyorrhoea acures toothache.

NIBS

We are glad to receive two samples nibs, one of which is for red ink and the of is relief nib. These are manufactured by C Karmakar & Co., Anandapuri, Barrackpore, Parganas, West Bengal. We have tested in ibs and found to be good and serviceable

LIFE INSURANCE DIRECTORY, 1950

We regret that in the last issue some encrept in in reviewing the book on pages column 2. The name of the book was wrong given as the Insurance Directory 1950 wind should be Life Insurance Directory 1950. A publishers of the book are Chhaya Publicat 1 td., and not Chhaya Publishers Ltd., as a there through mistake.

TRADE ENQUIRIES

(To communicate with any party write him direct with name and address given be'en mentioning Industry.)

1032 B.R. Tibarawala, Ratan Nacat, Inner -Wants to be put in touch with the support Coptia Tecta and Leopard stone.

1071 T. Ram Chander & Co., 15, Mana Gandhi Road, Gali. No. 1, Indore City. W.m. be put in touch with the manufacturers of ! tacks, penal pins and rivels, china clay ! owners in Chaibasa Kendposi, Bombay !! dency and Kathiawar and tamarind seed if and tapioca flour manufacturers of Madras !! Mysore.

1125 National Stores, Kamptee, (MP.) Wants to be put in touch with the wholeso dealers in fish.

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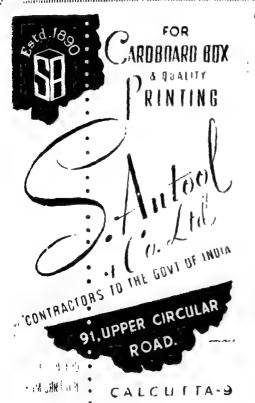
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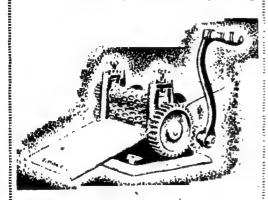
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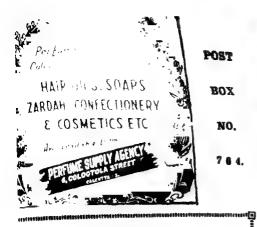
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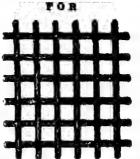
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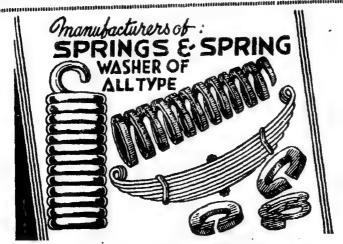


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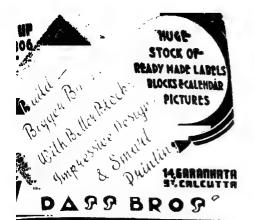
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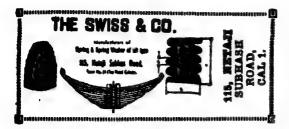


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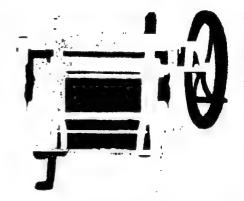
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VOL. XIII.

CALCUTTA, SEPTEMBER, 1951.

No. 498.

INDUSTRIES BOARD

THE INDUSTRIES Development and Regulation Bill which will shortly be before the Parliament draws once more public attention to the economic ills that the country is suffering from and to the measures for their quick redress.

Plans for extension of production in industrial concerns as a whole are in the air but the target of production in existing undertakings as based on their installed capacity seems to remain unrealised. The industrial development is also of haphazard character bringing in duplication of work in many cases and does not take into consideration the usual factors that go towards success of industries.

Another outstanding fact that comes to light is that the industries which are granted protection or subsidy often do not fulfil the conditions under which the protection is allowed, and thus defeats the very purpose for which the protection is offered. There should be some machinery in operation which should see that the conditions laid down are fully complied with.

It is with the object of liquidating these and similar problems that the constitution of an Industries Board having authority to exercise control over industrial matters is under contemplation. The formation of the Board as envisaged in the Industries Development and Regulation Bill aims at bringing certain important industries under the purview of the Central Government from that of the State Governments for facility of control. The Board will consist of three persons having wide experience in industrial, commercial, technical, judicial matters, or in administration. The power of granting licence of new undertakings and capital issues will also vest in the Board which may lay down conditions regarding location, minimum size, etc. of the industries for which licence for starting is issued.

Among the provisions of the Bill which have met with the sanction of the Planning Commission, special mention should be made of the following. These speak for themselves.

-CURRENT TOPICS

FHE SYMPOSIUM ON RUBBER

A symposium on rubber was lately held tt the National Chemical Laboratory of ndia, in Poona, Rubber manufacturers, planters, chemists and scientists, whether ntimately or remotely connected with ruber industry, were among those present in he conference. It is understood that the ubber section of the Laboratory which is ictually working within the High Polymer ection is carrying out at the moment nothing more than theoretical work. This infortunate state of affairs is due to the act that the equipment of the rubber laboraory is still very far from complete. Over ind above this the staff is not sufficiently arge to carry out all the routine connected with more practical work. equipment is particularly felt at the moment secause the NCL does not possess laboraory mixing mills: moreover rubber manuacturing equipment and apparatus for physical testing such as tensile strengths, plasticity, etc. are not yet available. Thus, he work is limited to test tubes and hemical analysis, which is quite naturally

a great handicap. This is most regrettable after all the tall talks of industrial research of practical importance in National Laboratories recently constructed at huge expenses made by the Government.

While on the subject it may be pointed out that testing of rubber products n accordance with world-wide recognised standards is of first rate importance. and should be started in the Laboratory. The drawing up of specifications of ray materials is of some importance. The working out of manufacturing methods and special compounds might fruitfully be included in the programme of the Rubber Section of the National Chemic 1 Laboratory. These: are problems small manufacturers who are not equipped with the requisite knowledge and the testing laboratory where they could carry out experiments. If they could turn to the NCL, they could progress and satisfy the ever-growing requirement of the customers. Such services could be rendered against definite: fees which would. cover the cost and solve the financial

(Continued from page 249)

The Government can investigate certain specified industries or undertakings in industries (a) which show a fall in production, a deterioration in the quality of the product, a rise in the price of production or which show tendencies in these directions, (b) which use resources of national importance, and (c) which are managed in a manner likely to harm the interests of the share-holders or consumers, and issue proper directions for rectifying the drawbacks; and can take under its own management undertakings which fail to carry out its instructions for improvement in management and policies.

These are wide powers indeed and are likely to have a most deleterious effect on the development of the country by putting new helter round the neck of industries, if abused in any way. Yet the necessity of a measure like this for the all-round and balanced industrial development of the country cannot be ruled out. We believe there are still men of strong moral calibre and administrative foresight who can offer correct directive

roblem connected with such work. Again, great deal has been said about manufacting all raw materials required by the aber industry in India. Most of the aterials can actually be made here atthout much difficulty and it is to be oped that the NCL should lend a helping hand to any-one who is interested to take up a particular item. Improvement in tanufacturing methods and consequent orger markets for finished products are lso pre-requisite.

DIFFICULTIES OF THE SOAP INDUSTRY

The main difficulty soap industry is acing at present is the question of prouring adequate supplies of vegetable oils it world level prices. India which once vas the biggest producing and exporting ountry in the world in oilseeds and oil, tas taken a secondary place and excepting virhaps in groundnut oil and castor oil ndia is far behind the other producing countries. The production of coconut al which is considered to be the main soap nakers' oil is estimated to be 70,000 tons n India against the country's demand of 80,000 tons and India has to depend on the import of 1,10,000 tons trom outside, the main supplying centres eing Ceylon, Penang, Singapore and Philippines. Government have of course realised this position as is proved by their placing the import of main vegetable oils such as coconut oil and palm oil under the O.G.L. without giving any consideration to the question of price. There is no com-Parison between the price we have to pay for coconut oil in India and the prices at which other importing countries are gettmg supplies. In the United Kingdom main ods and fats are imported on Government amongst distributed and 3: Count consumers at fixed prices. While negotisting trade agreements with producing countries they simultaneously fix the quantities to be supplied, as well as the price,

whereas in our case we have been able to procure very little quantity from outside with no fixation of price. Thus crude coconut oil is available in the London at £. 126/-(approximately Rs. 1,700) per ton, whereas the price of coconut oil in the producing centre in India is ruling in the neighbourhood of Rs. 2,400-. The question of procuring supplies of vegetable oils at reasonable prices and arranging for its equitable distribution among essential consumers must hence be given top priority by the Government without which there is little hope for the sound survival of the industries depending upon coconut oil.

It may be added that the Government of India at present levy a standard duty of 42 p. c. and a preferential duty of 30 perfects, on the import of this commodity. The main supply centre for India is Ceylon with whom our Government have entered into a trade agreement. Ceylon Government levies an export duty of Rs. 325/- per ton, while our Government collects an import duty at an advalorem basis at 30 per cent. Thus more than 40 per cent, of the landed cost of coconut oil constitutes duties payable.

It may be mentioned here that the India declared their of Government policy of effecting a gradual duction in the prices of essential goods and making availables to the industry dependent on imported raw materials their requirements at as low a price as possible but when it actually comes to implementation of their intention, they only confuse the issue instead of appreciating particular aspects of any representation. It is imperative that the present high import duty on copra, coconut oil, palm oil, etc. should be removed as this is the chief factor which contributes to the high cost of imported oil. Soap makers should be enabled to get their supplies at prices which they can afford. It may be added that the increased cost of oil is reflected on the higher cost of production and most of the manufacturers are working on the minimum scale to restrict their loss, there being no margin between the production cost and sale price. The result of this is more than 60 per cent. of the installed capacity is lying idle and if deterioration is to be stopped Government should adopt strong and effective measures.

FERTILISER PACTORY

The Sindri Fertilizer Factory, Asia's largest fertiliser factory is expected to start working in September. Finishing touches are at present being given to the plant. Of the four main engineering sections into which the factory can be divided, three sections viz., the Power, the Gas and the Ammonium Synthesis Sections are complete; in the fourth section viz., the vital Sulphate Section all that remains to be done is some last minute cabling and instrumentation work.

Sindri has a production target of 1,000 tons of ammonium sulphate daily or about 350,000 tons a year. This annual target is expected to be reached during 1953. The present demand for artificial fertilizers in the country is in the neighbourhood of 400,000 tons annually, but it is expected to multiply fast in the next few years as the Indian farmer is gradually awakened to the advantages of modern methods in agriculture. It is estimated that Sindri's maximum capacity would meet only oneseventh of the ultimate demand between two and three million tons annually. present there are six small plants in the country, manufacturing ammonium sulphate. Their rated capacity is 80,000 tons, but production in 1949 was only 46,000 tons.

The Sindri factory has been planned in such a way that the outturn can be doubled by the installation of additional equipment. Alternately, the factory car also be expanded to produce differen types of products, such as nitric acid fo India's chemical industry in ammonium nitrate or nitro-chalk as fertile zers, etc. In the process of manufacture o 1,000 tons of ammonium sulphate per day about 900 tons of calcium carbonate sludge will be thrown up as a by-product. Plan are under the consideration of the Govern ment of India for utilising this by-produc as a raw material for a cement factor with an installed capacity of 300 tons poday of first class Portland cement. For its working, the factory would require each day 12 million gallons of water, 600 tons of coke and 600 tons of coal. The daily con sumption of gypsum, the main raw mate rial, would be in the neighbourhood o 1,800 tons. In addition, 400 tons of othe raw materials would be required daily The power plant would have an installed capacity of 80,000 K.Ws., part of which will be "exported" to Bihar for othe industrial development. The gas plant in the factory would provide 33 million cubic feet of gas each day.

GLASS SAND IN BUNDI

The occurrences of glass sand have been located lately in the West and South-West of the Naini area along the G. I. P. Railway and an important deposition the Bundil district of Rajasthan. The sand in all these areas occurs in Vindhy a quartzites which have become friable a suitable places to give rise to the deposit. The reserves near Bundi in Rajasthar have been estimated at 1,62,000 tons and those in the Naini area at 110 million tous. Both the deposits are within easy reach of the lines of communication.

Technical details of the composition of sands discovered indicate their suitability in the production of various types of glass. In the sand in Naini area the salication content varies from 90.87 to 99.04 per

The ferric oxide content is above .1 per cent. but less than 0.2 per cent. 'he latter indicates that while the sand lay not be quite suitable for optical and ne best crystal glass, it is good enough for late glass, window glass, white bottles. tc. The grain size is very satisfactory. It also possible, that some of the best uality sands from this area may be found uitable for the manufacture of optical lass after suitable beneficiation. It is furper noted that the sand reserves in Bundi rea are of a superior quality. The ferric xide content is less than 0.02 per cent. hich is within the specifications required or the manufacture of optical and best rystal glass.

LUMINIUM INDUSTRY

Protection to the indigenous aluminium idustry was granted from the 15th May 949, by means of a subsidy-cum-addition-I specific duty scheme. Subsequently, epresentations were received from the idustry that the rates of subsidy granted ere inadequate. The Government of idia did not accept this contention but asired the industry that a review would be ndertaken by the Tariff Board after a ear's working of the scheme. Accordingthe Board has made a review and subutted its report confirming that there is no ise for alteration in the rates of duties on luminium products as fixed under the proction-cum-subsidy scheme of the 15th lay, 1949. Following the recommendaon the Government consider it unnecesry to continue the additional specific duty n aluminium ingots, sheets, and circles, iving regard to the increase in the price I imported aluminium, but consider that te existing protective duty of 30 per cent I valorem should be continued until the th May, 1952. The Indian Tariff Board irther recommended certain safeguards connection with the payment of subsidy y Government to producers.

Government of India have given careful consideration to the recommendation of the Board and have decided that, as a general rule, payment of subsidy by the Government of India to a Company shall be subject to the following conditions: (a) that the Company agrees to have on its Board of Managing Directors a representative of the Government of India as one of the Directors, with the same powers, privileges and functions as any other Director on the Board and (b) that the Company agrees to furnish the Government Director with such information in regard to the working of the Company as he may, from time to time, require.

KAPOK INDUSTRY

Kapok is found growing wild in forests and on waste lands and river banks in most parts of India. No attempt appears to have been made to grow these trees on a plantation basis excepting by the Forests Departments in Assam, Madras and U. P. It is, therefore, difficult to estimate the total number of trees in existence or of the area covered by them in the Indian Union. However, it is clear that the quantity of kapok floss collected in the country at present forms only a small proportion of the kapok actually grown. There is also no planned collection of kapok in India. It is collected by individuals for families in very small quantities in villages and sold to local village merchants or itinerant dealers. The prices paid to the collectors by village merchants are very low and their margin of profit ranges from 20 to 50 per cent. It is further estimated that the quantity of raw floss collected in India averages about 90,000 maunds and another 70,000 maunds are obtained from the adjoining districts of Eastern Pakistan. The quantity of ginned and cleaned floss averages 60,000 maunds per annum. Of the latter, about 25,000 maunds are used 35,000 internal consumption and

being Australia and New Zealand.

Almost all the processing factories handling kapok are situated in Calcutta. which is the principal packing and exporting centre for this product. For many years Indian kapok was not considered as good as Java kapok for preparing life-saving appliances. It was only in 1919, when the Imperial Institute in London conducted certain comparative tests that it was found that Indian kapok was equal, if not superior, to Java kapok. These findings were subsequently confirmed by the experiments conducted by the Mercantile Marine Department, Calcutta, and the Marine Surveyors of the British Ministry of Transport. But Indian kapok does not even today enjoy the reputation enjoyed by Java kapok. To a certain extent the reason for this is that Indian kapok is not generally as well graded as the produce from Java, and it is sometimes adulterated with cotton waste and akund floss which makes it quite unfit for use in the manufacture of naval life-saving appliances. With a view to developing export trade and establishing a reputation for quality, it is essential that no kapok from this country should be allowed to be exported unless it is pure and graded in accordance with the standard grades prescribed under the Agricultural Grading and Marketing Act. 1937.

PROGRESS IN TOBACCO RESEARCH

The nicotine sulphate which is used in the manufacture of insecticides is not now produced in India. The Council of Scientific and Industrial Research therefore intends to install a pilot plant for same. Experiments were previously made by the Indian Central Tobacco Committee to gauge the effect of farmyard manure, castor cake, and groundnut cake on the yield of bidi tobacco. On experimenting it has been found that of these organic manures, castor cake gives the best result.

the yield having risen in this case by abou 50 per cent. over the unmanured field Viewed from the standpoint of the nitrogenous doses administered by thes manures, it is revealed that, the greater the nitrogen content of the manure, the greater would be the yield.

CELLULOSE-BEARING MATERIALS

Plants to undertake processing c cellulose pulp to make cellophane sheet and rayon is now well under progress. B. the cellulose pulp itself is to be importe from abroad and there is practically n factory for its manufacture in India. It learnt that a technical survey of the variou cellulose-bearing raw materials found India and other cotton linters has feen car ried out under the auspices of the Counc of Scientific and Industrial Research. Th pulp obtained from various types a wood, bamboos, reeds, straw and bagasand some of the fibres available in differeparts of the country have been chemicall tested as regards their suitability for u in rayon manufacture. It is encounragin to know that pulps from bamboos, reed and bagasse have been found to compar favourably with American and Swedis pulps used by the rayon industry in the Both the viscose and acet if countries. methods have been applied for the purpos and the articles prepared from the shee so obtained are found to be comparable quality with those prepared from the imported pulp.

SUBSTITUTE FOR CEDARWOOD OIL

Saw mills engaged in the use of Deod wood and having surplus of large quant ties of saw-dust and shavings will be interested to know that experiments carried or at the Forest Research Institute, Dehr Dun, have shown that the sawdust an shavings yield by steam distillation of effective substitute for cedarwood oil which is a valuable insectifuge and is also a component of perfumes.

-THE ART OF PYROTECHNY

ROTECHNY is the art of making freworks. It is said to have had its in in the East, firework displays being known in China for many centuries r to their introduction into Europe, and in this day the Chinese and Japanese I in the production of certain fireworks reat beauty.

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Not withstanding the great variety of its produced by the many different kinds vorks, they all have certain fundamenessential in common. All fireworks ain a combustible substance, and a corter of combustion. The combustible, he fuel, may be either one or more of reat variety of substances, such as hur, carbon, shellac, resin, pitch, starch, ir, lycopodium, various picrates, partirly the potassium and amonium: ous sulphides, as those of iron, antirly, arsenic; various metals, as iron, her, antimony, zinc, magnesium, and minium.

The supporters of combustion are aly certain oxygen salts such as chlo s and nitrates, which are readily able to · up their supply of oxygen to the The pyrotechnist bustible bodies. om supplies the fuel with sufficient ount of oxygen salt to bring about the plete combustion of the former. ct of the firework maker is not to harge into the air the completely lised products of combusting, but er to throw out a certain quantity of erial which is in a condition to enter active combination with the oxygen of air and to carry on its combustion at expense of this outside supply of gen.

The various mixtures, which are used to produce certain results have, in most cases, been arrived at, not by processes of scientific reasoning, but by purely empherical rules. Although the art of pyrotechny regarded as a chemical one, it embraces many mechanical considerations and details which are of no less importance to the production of scenic displays than those which are more distinctly chemical.

RAW MATERIALS

The following are some of the most important materials employed in the manufacture of pyrotechay:

SALTPETRE

Saltpetre is the most important ingredient required in the manufacture of pyrotechny. The refined variety is suitable for this purpose.

Specifications for saltpetic to be used at fireworks making call for a salt that is clean, white and should be ground fine enough to pass through a sieve of 80 to 100 mesh. It should contain less than 1% of rodam, calcium and magnesium salts combined.

POTASSIUM CHLORATE

Potassium chlorate is a very necessary chemical used in pyrotechny as a supplier of oxygen. For firework purposes it should be white, contain less than 1% of sodium, calcium and bromine combined. It should be of the same fineness as saltpetre. It produces explosive composition with sulphur. Hence great care should be taken in its use.

POTASSIUM PERCHIORATE

This substance forms another useful addition to the pyrotechnist's art. It is less liable to decomposition than chlorate. Containing even more oxygen it can be substituted for the chlorate in most mixings and can be safely used in connection with sulphur.

SULPHUR

Sulphur is used almost exclusively in making fireworks. Specifications call, for less than 1/10 of 1% of impurities and the finely ground should pass through a sieve of 120 mesh.

CHARCOAL

Charcoal used in pyrotechny manufacture should be produced fresh from soft wood. Its preparation is given separately. Charcoal that has a brown tint indicates incomplete carbonization and should be avoided. Also it should contain a minimum of grit.

STEEL FILINGS

Steel filings are used in various ways in producing scintilating effect in fireworks. The best steel filings for gerbs is known as needle steel. The steel filings from raw filing shops are quite good provided they are the result of hand filing and not the particles thrown off by emery wheels, which are useless for pyrotechnical purposes. When steel filings are added to gerb compositions, the saltpetre quickly attacks them, frequently causing the gerb to become quite hot. The steel is rusted and this action practically destroys its usefulness: To prevent this the steel must be coated in some way with paraffin that the saltpetre cannot attack it which may be accomplished as follows: -

In an agateware saucepan place a piece of paraffin and carefully melt it, heating as much as possible without permitting it to smoke. To this add clean steel filings, as much as the paraffin will thoroughly coat. There should be no surplus of paraffin but just enough to completely cover each filing. Shake the pan and stir frequently while cooling to prevent the filings from caking. Steel filings are also used for stars in rockets and shells.

Besides, the above ingredients the following materials sometimes come into the composition of important fireworks:

sodium oxalate, copper sulphate, pa green, dextrin, antimony sulphuret (black red arsenic, picrates, aluminium a magnesium powder, etc.

REFINING OF SALTPETRE

The saltpetre generally contains seve impurities, the most troublesome of whi are the chlorides. Since saltpetre is mair utilized in the manufacture of gun-power and fireworks, it is absolutely necessary remove the objectionable chlorides, becauthey really absorb moisture and thus spothe whole. The usual method adopted the manufacturer is stated thus:—

In an iron pan 1050 lbs. saltpetre dissolved in 600 lbs. of water at a gent heat; the solution is brought to boiling heat, and another 188 lbs. of saltpetre dissolved in it. When employing the proportions with saltpetre containing abo 20 p. c. of chlorides the nitrate is dissolve completely, but the chlorides partially, '1! latter is fished out with a perforated lad if colleium or magnesium salts are prese potassium carbonate is added until a fair. alkaline reaction has been produced. The hot clear liquor is diluted with 300 lbs a water, a solution of 1 lb of glue dissolve in 44 lbs of hot water is stirred into it, an the whole brought to boiling again. glue combines with organic substance present forming scum which rises to th surface, the liquor is allowed to settle for 24 hours in a warm place and the clea portion is run into flat copper coolers. A soon as the crystallisation begins, the liquit is constantly stirred, either by hand o better by machinery. Thus the potassium nitrate separates as minute, flowery crys tals. These are drained off and cold water is sprinkled over them to remove all adhering mother liquor. This is usually done is vessels provided with a perforated false bottom, covered with linen. Finally the flowery particles are dissolved in a small quantity of hot water and then set aside to

als of saltpetre begin to appear. It is a aluable fertiliser.

PREPARATION OF WOOD CHARCOAL

As charcoal is the only product in view. ne carbonization of wood may be done in its or kilns and the volatile products go , waste. For this purpose the wood is eaped in a hemispherical pile around a entral opening, and covered with earth nd sod, leaving only a few small draught oles near the bottom. Then it is ignited t the centre and allowed to burn until the thole pile is on fire. A smouldering comustion takes place, largely at the expense f the oxygen and hydrogen of the wood bre, forming water, carbon dioxide, and olatile hydro carbons, which escape, the raught holes are then all closed and the eat is kept carefully covered until the fire nothers and the charcoal is cold.

FORMERS

All paper cases are rolled on formers f one kind or another. For rockets these lay consist of hard wood sticks but better ormers are made of light brass tubing with n outside diameter equal to the inside iameter of the case desired. They should a one to two inches longer than the intended case and fitted with wooden handles to nable them to be easily removed when ase is rolled.

Mines are rolled on wooden formers, ne ends of which are turned down to concenient size to fit the hand. Roman candles re rolled on rods of machine steel while witch pipes and pin wheels are rolled on hin brass or steel rods. Lances are rolled n small brass tubing.

PASTE

Paste most suitable for Fireworks by be made as follows:—

Mix 4 oz. of wheat flour with 8 oz. of later and 1/8 oz. powdered alum, rubbing ntil free of lumps. Pour this slowly with constant stirring into 16 oz. of boiling

water to which has been added 5 drops of carbolic acid, 5 drops of oil of cloves and 2 grains of corrosive sublimate. When cold it should be ready for use.

MEAL POWDER

Mount a 50 gallon wooden barrel on two uprights so that it will revolve freely on centres fastened to the heads. On one centre attach a crank and cut a hole (close by a suitable plug) into side of barrel for putting in and removing the necessary ingredients. Place in the barrel 300 to 500 lead shots or balls about one inch in diameter. When it is desired to make meal powder, put into the barrel a thoroughly mixed composition as follows:—

Saltpetre	15	lbs.
Charcoal	3	
Sulphur, flour	2	44

Put the ingredients into the barrel and revolve it for about 500 turns, when the mixing may be complete. But more revolutions of the barrel may produce stronger powder. Great care must be exercised to see that no foreign matter such as nails, gravel, etc., find their way into the barrel as this might result in an explosion.

STAGES OF MANUFACTURE

For convenience the manufacture of pyrotechny may be divided into three stages.—

- 1. Preparation of mixtures.
- 2. Manufacture of cases.
- 3. Loading the cases.

PREPARATION OF MIXTURES

The mixtures used in fireworks are called compositions or fuses, and their preparation requires some care. In order to obtain good results out of the materials and also to avoid accident in handling explosive substances, a knowledge of chemistry is indispensible. Many mixtures also are hable to undergo chemical decomposition so that they can only be employed. When the firework is to be used within a

short time of its manufacture; other mixtures are liable to more rapid spontaneous decomposition resulting in the ignition and explosion of the materials.

Mixing is, therefore, considered the most important operation in fireworks.

In mixing on a small scale, round brass wire sieves are the best. For lances and the more particular work 22 to 26 mesh may be used while for plain making 16 to 18 mesh is suitable. If 25 lbs. or more of composition is to be mixed ordinary painted wash tubs are most convenient and the sieves should be made so as to just fit inside the upper edge of same while for mixings of from 100 lbs. up troughs are often used. For these, the sieves are made square and fit just inside the troughs, same as with tubs. Mixing machines are sometimes used for bright work or mixings containing no chlorate of potash but they are too dangerous for colours.

With the plain mixings, the coal is weighed first and put into the bottom of the tub: then the sieve put in place and the sulphur, saltpetre etc. pushed through it. When everything is sifted, bare the arms and mix well in every direction. Place the sieve on another tub of same size and sift from the first tub into the second one, a scoopful at a time. When all has passed through for the second time repeat once more into the first tub, mixing between siftings and after last sifting. For ordinary compositions this is sufficient but some mixtures are passed four or five times through the sieves.

In coloured mixings more care must be observed and each ingredient sifted separately the first time, except the shellac, coal, etc. which can be put right into the bottom of the tub. Never throw the chlorate of potash on the sieve at the same time with dextrine or other hydrocarbons but sift the potash first and add other salts one. Great care should be taken

never to let the fingernails strike the sleve while sifting as it is very easy to "strike fire" from such causes, with disastrous effect as sharp star compositions in a loose state are almost as explosive as meal powder. Special mixings will be described when we come to the compositions requiring them.

MANUFACTURE OF CASES

All kinds of fireworks require a case of some kind. A good case must be tightly rolled and almost as hard as iron. The best arrangement for case rolling is a sort of large desk made of tongue and grooved flooring tightly joined and firmly nailed to sills of about 2 inches thickness and tapering from 2 inches in front to 6 or 7 inches in the back so as to from a gentle rise from front to rear. According to the work to be done the rolling board may be made from two to four feet wide.

Most cases are rolled from strawboard. For rockets two or three turns of cartridge paper are used first, backed up by five or six turns of strawboard. The cartridge paper being waterproof swells and contracts but little in rolling while the strawboard, being absorbent swells considerably; therefore when the strawboard is rolled on the outside of the case, it contracts in drying and is shrunk on making a very firm case. The recently produced kraft paper makes an excellent case.

Owing to the great variety in size required, the cases are all made by hand. The tools employed are of the very simplest description, consisting of a wooden or metal roller called the "former" and a sort of wooden board with a handle on one side, known as the "rolling board." For the larger cases the paper is pasted over its whole surface, and rolled round the former, the operation being done on a narrow slate table. The rolling board is then passed rapidly over it a few times with a firm steady pressure. The former

then withdrawn, and the case stood on d until it is so far dry that it can be laid its side without risk of its losing its lindrical shape. It is then stacked in a 1 in a chamber through which a current hot air is circulating, in order to render perfectly dry. In many fireworks the ses have to be partially closed, or conicted near to one end. This is technilly known as "choking." It may be ected in two ways, either by compressg the walls of the case to the desired tent, or by partially filling the mouth of e case with clay. When the first of these ans is adopted, the operation is perform-I when the case is freshly made, and aly partially dry. For small fireworks it done by means of a hand lever made of wo blades of steel, and screwed to the dge of the table. For larger cases a foot ver is employed.

When the construction is effected by neans of a clay plug, the operation is perormed at the time of loading.

For small cases the paper is pasted only along the edges, the former, in this case a thick metal wire, is placed nearly in the middle of the paper. One end is then folded over nearly to the other, and the double paper rolled over the former.

The cases may be closed at one end by folding the paper in upon the end of the former. These cases require no special drying chamber.

Besides cylindrical cases, there are cases made in the form of a sphere, known as "shells." These shells, which are constructed of various sizes, upto even 24 miches in diameter, are made by a process technically known as the "wetbroke" process. Brown paper of a specially good quality is thoroughly pasted on both rides; strips are then torn from the pasted length, and laid upon the inside of a hemispherical bowl or mould, the strips radiating upwards from the centre to the circumference; the ends lapping over the

edge of the mould: the workman continues this process until the desired thickness of paper is obtained. It is then removed from the mould and allowed to dry. These hemispheres are then placed in a lathe, and the rugged lips or rins carefully turned off. Two of these hemispheres are securely glued together to form the complete shell. These shells are destined to carry coloured stars and to be fired from a mortar; the mould in which they are made has therefore a slightly raised ridge running part of the way down. From the circumference, and producing a corresponding indentation or "dimple" in the shell, which allows of room between the shell and the side of the mortar for communicating the fire to the propelling charge below.

LOADING OF CASES

The loading operation varies in details according to the type of firework to be filled, but it may be divided into two parts, viz. loose filling and ramming. The apparatus employed in the first of these methods is a metal funnel of an elongated shape, and a wire, the operation being known as "wire and funnel" filling. The wire is usually square, and of such a thickness that it will just pass through the end of the funnel. The case to be filled, if a choked case, is placed upon a stand with its choked end fitted upon a nipple fixed for its reception; the stem of the funnel is then inserted into the open end of the case, and by drawing the wire quickly up and down the composition is pushed down uniformly into the case. When full to the required height the case is closed up. With small fireworks (such as squibs, etc.) this is done by firmly squeezing the end of the case with a tool known as the "closing in" machine, and finally dipping the end into a composition made up of glue and red lead commonly called "dip."

Company of the control of

Long narrow cases are filled without e use of a stand. For wheels no special ols are required, the long narrow tube ing wound by hand upon a small wooden sc, and secured by strips of tape or paper ued across. In the manufacture of cracktwo special pieces of apparatus are quired. The first is a rolling or flatten-1 machine. The filled cases are passed tween the rollers of this tool, and reby squeezed flat, the pressure being refully regulated to the required degree. e other tool is the bending machine. te cans are bent backward and forward er steel wires about the thickness of a ut steel knitting-needle, until the reisite number of bends is obtained; they then pressed firmly down with a piece wood, and removed from the machine. e bent case are then tied up into the niliar compact form with a suitable ead, and the ends primed in the usual v with touch-paper.

Of the second method of loading cases composition is rammed in, viz. the man candle, in which the mixture is the training that the rocket, in which malleted. The case of a Roman candle straight or unchoked one. It is placed in a block and the projecting core exply fits into the case.

A small quantity of of finely-powderand sifted clay is first introduced, and itly driven down by means of the rama wooden rod which loosely fits in the By pressure the clay sets to a still d mass. The case is next to be filled the composition, and coloured stars, rnating. Each layer of mixture is introed in two quantities, and rammed m. Care is taken to regulate the charge nixture, so that each star shall be blown to the same distance.

Rockets are loaded by the mixtureig forcibly rammed into the case by a
let, and as this firework is in some resis of a special construction a brief

description is given at the proper place to make it understandable.

ROCKETS

Rockets are perhaps the most popular article of the pyrotechnical craft. So much has been written about sky rockets that any general description would be superfluous. Suffice to say that rocket consists of a tube of paper, rammed with suitable composition, its lower end choked to about ½ rd. the diameter of its bore and a hollow centre extending upward through the composition to about ¾ inch of the top. A stick is attached to the tube serving to balance it while ascending.

Rockets are fitted with cap containing the garniture of the rocket which may take the form of stars or other pyrotechnic effects, or a gun-cotton wad, or similar explosive to make a sound signal, or small cases, charged with picrate of potash, producing the well-known whistling rocket effect.

The cap is either cylindrical or in the form of a truncated cone, with a conical or other top. The cap is burst open and the contents ignited by an opening charge of powder lighted through a hole bored in the clay diaphragm above the heading, so that when the heading is burnt through the fire may be communicated to opening charge.

The body of the rocket is of paper tube constricted at the lower end either by squeezing and then tying with a ligature. or by means of a clay plug.

COMPOSITION

The following are good compositions for rockets of different sizes:—

	1 to	4 to 8 oz.	1 to 3 lbs.	4 to 8 lbs.
Saltpetre	18	16	16	18
Mixed coal	10	9	12	12
Sulphur	2	4	3	3

If on trial rockets burst add more coal f they ascend too slowly add more altpetre.

In order to fill the body a conical mould s inserted through the constricted end. point upwards, and the propellant charge hen added little by little and well malleted nome. Considerable skill is required n doing this as the packing must be juite even if good results are to be obtaind. When the propellant has been added he top is closed with a perforated clay ilug through which a piece of quick match touch paper) passes in order to fire the ead, and conical mould then withdrawn. he head is another paper case containing burster charge of gun powder and garniare in the form of stars, floating stars, or chistling fireworks, and is glued on to the ody. The stick is then attached so that 1e rocket balances when supported about ne inch from the base. It is fired by aplying fire to the conical hole left in the use by the mould. The outrush of gases nuses the rocket to ascend, and when at s maximum height the quick match causes ne burster charge to explode, thus liberatig the garniture.

TOUCH PAPERS

Touch paper is much used for igniting reworks, and is made by brushing paper, sually blue in colour, or one side with a slution of nitre (half a pound to the gallon) and then drying. Slow match for pyrotechnopurposes is made by soaking blotting aper in lead nitrate solution (2½ lbs. per allon) and, after drying, pasting the sheets spether, usually so as to give six thickness-Pyrotechnic quick match, on the other and, is made by impregnating lamp wick allon with a smooth cream of hot starch plation and meal powder, and then dusting over with dry powder.

STARS

Stars are very similar in nature, but are intained in a rocket or shell, and only

liberated and ignited when the rocket or shell has reached its maximum height. They consist of fiercely burning mixture containing chemicals to impart colour to the flame. We now show how stars are made.

These require considerable care in preparations success depending upon the uniform fineness, the intenate union, and the dryness of the ingredients.

There are two types of stars, namely "naked" and "pill box' stars. The former is composed of a mixture of charcoal, sulphur, meal powder, and nitrate of a metal to impart the desired colour, the ingredients being mixed together with shellac, and then either moulded into pellets or spread out can cut up into cubes, after which the solvent is dried off and the stars loaded direct into the tocket. These stars should only be employed in fireworks of the smallest sizes, as they are very apt to crumble. In any case to avoid crumbling it is very important to use shellac or other binding material which is completely soluble in the solvent used, usually methylated spirit, As a rule no special device is used for igniting naked stars, ignition being brought about by the burster charge and for this reason they are almost invariably composed of nitrate mixture and not chlorate mixture. In any case a naked chlorate ctar in contact with meal powder cannot be used as it would mean having a chlorate in contact with sulphur.

Coloured rocket stars are also made by driving the coloured composition, slightly moistened with gum water into small cases which go under the name of pill-box cases. These are known as pill-box stars and are much safer than naked star. If the star is to consist of one colour only, these pill-boxes are open at both ends, and a piece of quick match is placed between the composition and the inside of the pill-box and allowed to project about half an inch beyond each part of it. When fired these,

urs hurn at both ends at the same time, id so produce a great amount to smoke in oportion to their size.

If it is required to make stars consisting more than one colour, the pill-boxes are ft open at one end only. The composition thus prevented from burning at more an one of its surfaces at a time. These ars generally contain two colours: the ll-boxes are half-filled with one-coloured imposition and the remaining space is led with the other composition.

Red		
Potassium chlorate	47	parts.
Sugar	21	••
Strontium carbonate	22	**
Blue		
Potassium chlorate	80	parts.
Sugar	50	
Cuprous sulphide	30	**
Mercurious chloride	40	**
GREEN		
Potassium chlorate	13	parts.
Sugar	11	.,
Barium nitrate	15	**
Mercurious chloride	11	**
YELLOW		
Potassium chlorate	59	parts.
Sodium oxalate	17	**
Shellac	24	••

Magnesium or aluminium powder is lso sometimes added in the above in order 3 increase the brilliancy.

WEISTLING FIREWORKS

The peculiar property of potassium icrate to whistle while burning has been nown for a long time and has been made se of for producing the amusing whistling ireworks. To make this article dissolve lb. picric acid in the least possible quantity if boiling water, in a porcelain receptacle; dd \(\frac{1}{2}\) lb. potassium carbonate, little by ittle, stirring continuously. Then add 1 b. powdered saltpetre. Stir thoroughly,

allow to stand for one hour and remove to a heavy piece of filter paper placed in a glass funnel where it can drain. When dry crush to fine powder with a wooden roller. Very small quantities should be handled at a time as an explosion will cause disastrous results. The dry powder may be rammed into tubes from \(\frac{1}{4}\)" diameter and will produce the whistling sound when burned. Bamboo tubes are most effective

Owing to the ease with which potasipicrate detonates whistles cannot be used
in shells but small tubes \(\frac{1}{2}\)" diameter and
\(2\frac{1}{2}\)" long when charged with the above
composition may be placed in the heads
of rockets or fastened to the outside and
arranged to burn as the rocket is ascending.
Attached to wheels they are quite amusing,
but the most effective use for them is when
a series of six or eight ranging in size from
\(\frac{1}{2}\)" diameter are set side like a Pandaen Pipe and burned simultaneously.

ROMAN CANDLES

Roman candles are probably the most popular piece of fireworks made. On a small scale they are made entirely by hand that is, one at a time. To make these by hand roll the cases and have a lot of stars of different colours ready. Then made some candle composition as follows:—

Powdered saltpetre	18	parts.
Finely powdered char-		
coal	11	••
Flours of sulphur	6	**
Dextrine	1	part.
Water	1	or more

Mix all the solid ingredients well and sitt three times. Then add the water and mix again until the whole lot is evenly dampened. Then force through a 16 mesh sieve into cloth bottomed trays and dry in the sun.

Now provide a ramming outfit consisting of a pin block, a rammer, a composition scoop, a clay scoop and a gun powder, scoop.

Now place an empty can on the pin, our in a scoop of clay and ram it firmly ith a light mallet. Remove rammer, pour a scoop of gun powder on top of which rop a star and lastly, a scoop of candle imposition. Ram with about six blows f a light mallet. Remove rammer and our in another scoop of gun powder, anther star and another scoop of candle omposition, repeating this until case is illed to within 2 inches of the top. Remove candle and finish described under.

If the composition becomes so dry that will not pack fienly it should be dampend with a very little water. The stars hould be hard and dry and free from star lust which can be sifted out by shaking tars in a coarse sieve. The floor of raming room also should be kept free from ll accumulated composition to guard gainst accidents from friction of the shoes or otherwise.

LANCES

These are small paper tubes from 1" o 3" diameter 2" to 3½" long filled with omposition burning different colours with a duration of one minute and used for producing the different designs used in ireworks exhibitions, such as portraits, nottes, etc. The cases are rolled and ammed with funnel and rod, as previously described.

Some lance compositions are so light is to be difficult to ram. These should be slightly dampened first. Blue lances made with paris green and white ones using sadgar are frequently used without priming as they ignite very easily.

A good lance should burn clear for one minute, without flaring or clogging up. All colours should burn off about the same duration. If a lance burns to one side it is often because the composition is not well mixed or because there is more paper on one side than on the other. They should have about three turns of paper all around.

LANCE COMPOSITIONS

Data to	Parts	Parts
Potassium chlorate	16	16
Strontium nitrate	3	~
Strontium carbonete		3
Shellac	3	2
Lampblack	Ł	1
GREEN LAS	NCFS	•

Potassium chlorate	Parts,	Parta.	Parts.
Barium nitrate	7	4	4
Barium chlorate		-	5
Shellac	2	4	1
Calomel	*****	3	2
Lampblack		į.	
Picric acid		î	

WHITE LANCES

	Parts.	Parts.	Parts.	Paris.
Saltpetre	9	14	5	8
Sulphur	1	4	2	2
Antimony sulphide	2 2	~		-
Antimony metalic		3	1	
Meal powder	~~	~	1	
Red arsenic			_	1

Brue LANCES

Potassium chlorate	rts. 20	Parts.	Parts.	Parts.
Potassium perchlorate	ع	~	_	24
Paris green	~	5	-	_
Copper sulphate	. 6			_
Copper ammonium				
sulphate		-	3	****
Copper ammonium				
chloride		~		6
Shellac	4	~	1	_
Stearine		11	1	2
Dextrine	1	~~	_	
Calomel	4	3	3	-

YELLOW LANCES

	A L	l'arts.	Parts.
Potassium chlorate	16	4	4
Sodium oxalate	2	2	2
Shellac	3	1	1
Charcoal	1		
Barium nitrate		-	ł

TUBRI OR GERBES

Tubri or Gerbe is one of the most popular fireworks. It consists of easing or 251

mould of burnt clay. The case has two openings. One wide about 1 inch at the bottom and the other narrow like a pencil at the top. The former assists in filling up the mould with the composition while the other for kindling. When kindled a brilliant shower of sparks like that of a fountain emerges out with a great force and reaches a considerable height emitting dazzling light.

There are several varieties of gerbes and are named according to the nature of their displays.

A few typical recipes follow:-

I

Nitre	10 g	arts.
Sulphur	2 1	**
Charcoal	2	**
Cast iron filings	6	**
II		
Best crystals of		

Dest Crystals of		
potassium nitrate	26	parts.
Roll sulphur	10	,,
Light and fresh charcoal	3	**
Fresh cast iron filings	19	,,

Expose the ingredients in the sun to dry, then grind the first three substances separately in a mortar and pass through fine cloth. Weigh and mix. Now take the iron fillings free from rust and of the size of poppy seed—but the size may vary according to the shape and size of the mould used. Mix the whole and load the clay mould carefully through the bigger opening and press tightly, which is then plugged with hard mud. The smaller opening is then pasted on with paper which is ignited on firing.

CHANDRA MALLIKA

Nitre		10	parts.
Cast iron filings		4	••
Sulphur		2	,,,
Charcoal	•	11	₽,

Expose the ingredients in the sun to

iron filings separately in a mortar and pa through fine cloth. Weigh and mix. No take the iron filings free from rust and the size of poppy seed—but the size may vary according to the shape and size the mould used. Mix the whole and lost the clay mould carefully through the biggopening and press tightly, which is the plugged with hard mud. The smallopening is then pasted on with paper which is ignited on firing.

Hazari

Nitre	16	parts.
Cast iron filings	8	,,
Sulphur	3	,,
Charcoal	3	,,
Proceed as above.		

JASMINE

Nitre	80	parts.
Sulphur	5	**
Charcoal	6	**
Cast iron filings	10	**
D D		

Rose Bud

Meal powder	6	parts
Saltpetre	2	,,
Sulphur	1	part.
Charcoal	1	,,
Steel filings	1	••

FLOWER POTS

Saltpetre	10	parts.
Sulphur	6	**
Lampblack	3	,,
Steel filings	6	**

ELECTRIC TUBRI

In preparing this sort of gerbe the ingredients are generally of a quite different category. Instead of nitre, charcoal and sulphur which are used in making ordinary gerbes, use is made in this case simply of shellac of fine grade and chlorate of potash. For attaining success in manufacture it is desirable that the shellac should be reduced to powder and finally passed

ash is also sifted through a fine cloth. cautions should however be taken that ingredients do not come in contact h other substances particularly sulphur, erwise due to explosion dangerous conuences may follow.

A couple of typical recipes follow:-

A couple of typical recip	oes to	oilow: -
I		
Chlorate of potash	16	parts.
Shellac	6	
Magnesium	8	**
II		
Chlorate of potash	16	parts.
Shellac	4	٠,,
Aluminium	10	.,
FLYING TUBRI		

This should be prepared as fresh as sable. Otherwise, sugar being in cont with chlorate of potash for a good gth of time is liable to get oxidised with result that the Tubri is likely to burst I may not ascend to a great height, ind each ingredients separately and sift ough a fine cloth and then weigh out I mix.

ORDINARY

Chlorate of potash	10	parts.
Refined sugar	4	**
RED		
Chlorate of potash	10	parts.
Refined sugar	4	
Strontium nitrate	1	part.
BLUE		
Chlorate of potash	10	parts.
Refined sugar	4	**
Copper sulphate	1	part.
Green		
Chlorate of potash	10	parts.
Refined sugar	4	•,
Barium nitrate	1	part.
YELLOW		
Chlorate of potash	10	parts.
Refined sugar	4	,,
Soda	1	part.

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The ingredients are powdered separately, sifted, mixed thoroughly and then charged into tiny clay moulds.

SPARKLERS

The growing popularity of sparklers from day to day makes one think abuot its manufacture. But like other articles of commerce the details of this manufacture are not available. The following general process will serve the purpose with a little modification.

Powdered charcoal	25	parts.
Steel filings	30	
Aluminium powder	15	,,
Gum arabic	6	,,
Saltpetre	5	
Sulphur	2	

First of all work up the gum with water into the consistency of mucilage, the other items except the steel filings are stirred in. The steel filings lightly coated with paraffin is finally added.

Then work the mixture up to the consistency of porridge,

ELECTRIC SPARKLERS

The principal stick consists of wire or thin twisted metal, part of which is covered with a composition containing steel filings.

a a composition containing	2000	a manga
Fine steel filings	12	parts.
Pine aluminium powder	-1	part.
Potassium perchlorate	6	parts.
Destrin or gum arabic	2	,,
Water		q. s.

The steel must be protected from corosion with a little parallia. The gum should be made of the consistence of mucilage. Mix the ingredients thoroughly and add gum solution until a mixture is obtained that will adhere to the wires when they are dipped into it.

This varies in different sections and with different runs of ingredients. In practice, bunches of wires are dipped at once and slowly withdrawn in a current of warm, dry air which causes the mixture to adhere evenly.

A sparkler of great brilliance and which are every effective may be made as follows:—

Dextrin 3 lbs.
Water 12 pints.
Potassium perchlorate 10 lbs.
Aluminium powder (fine) 7 ,,

Take the dextrin add the same, little at b time to the whole water stirring continually so as to avoid lumps. Mix intimately the potassium perchlorate with finely powdered aluminium and add this to the gum solution, stirring until a perfectly smooth mixture is obtained. Wire of required size and thickness may now be dipped into it to the desired depth while it is contained in a deep vessel, and placed in a suitable rack for drying. It may be necessary to dip the sticks several times dependent on how much composition it is desired to have on them. In this case they should be dried with the composition end up, the first time so that much composition accumulates on the end beyond the stick.

POT-POTIA

This is a very amusing piece of firework. When scratched on the pavement it gives off a continuous series of little explosions,

Mix 5 kilograms of powdered gum arabic with 5 litres of water, adding water gradually with constant stirring. add 1½ kilograms of magnesium carbonate. Place this on a water bath with a thermometer arranged so that the temperature can be carefully observed and heat to 50°C after which add a mixture of 1 kilogram of white phosphorus and stir until entirely melted. Continue stirring while cooling to 25°C after which add a mixture of 21 kilograms red ochre and 3 kilograms potassium chlorate and stir cautiously until a perfectly smooth product results after which it may be poured in paper moulds In the money described below

Secure a number of boards of 3' material and bore holes into them 1" deer and 14" diameter. Turn up a puncher which will work easily in the holes. Cui some red tissue paper of good quality into circular pieces 21" diameter. Lay them over the holes in board and punch in Pour into those the composition and fold over the edges of the paper. Allow to set and when hardened they may be removed and thoroughly dried when they will be ready for use. In preparing this firework great care must be used to prevent accidents as the mixture containing phosphorus and potassium chlorate are liable to ignite on rough handling.

COLOURED FIRE STICKS

These consist of thin wooden sticks similar to applicators used by physicians applying iodine etc. to affected parts. They are dipped for half their length into coloured fire composition in a more or less liquid state.

One method is to melt one part of gum shellae in an iron pot. Stil in five parts of very finely powdered strontium nitrate. To keep this sufficiently liquid it must be kept quite hot by the use of a steam kettle. This is for red sticks. Another method is to dissolve the shellae in alcohol and adding the strontium. The proper consistency of the mixture can be easily regulated by using more or less alcohol as required. When the sticks are dried they are ready for use

Green is not so successfully mode, barium nitrate being substituted for strontium. A little lampblack improves the burning but detracts from the column especially the green. The sticks are pushed into a groove in the bar.

RUBY AND EMERALD SHOWER STICKS

These are much more effective and are made in the same manner as above, using fallowing assistion.

Dissolve shellac in alcohol and add ter ingredients, previously well mixed. It thoroughly to consistency of thick glue d dip sticks previously arranged in holder that they may be placed in drying rack.

For green use:

Aluminium powder
coarse 6 parts.
Barium chlorate 4 ...
Shellac 3 part.
Alcohol 9. S.

The Japanese make a similar article of isted paper but this requires a great deal practice to learn.

CHINESE CRACKERS

Chinese crackers are the interesting tle articles of pyrotechnics. These are epared as follows: —

The tubes or cases of these fire-works e 1!" long, !" outside diameter and have bore of 5/32". They are rolled of a soft coarse blotting paper. A small amount gum water is used as a burder and tasse is finished with one turn of very thin d, green, or yellow paper. They are alled in lengths of one to two feet stad en cut to the required size.

Now a block is prepared for gathering pout 1000 of these tubes. For this purse a piece of hard wood about 1" thick and cut into a hexagon is provided with binted wood or metal pins set into the rod base so that the above amount projects and exactly 1" apart. A tube is now appead over each pin until the entire block filled. A piece of white paper is now atted over the top of the bundle. When my it is removed from the form and a nece of paper pasted on the otherside when is dried again. The under side is noistened at the edges and the surplus aper neatly rubbed off. When again dry

the upper side is moistened all over and the paper over the top of each cracker is pierced with a punch or round pointed stick so that they may be charged with the necessary powder and clay. Some operators hold several sticks between their fingers at one time so as to be able to punch several holes simultaneously.

A wooden board about one inch wider all around than the bundle of crackers and I" thick with I" holes bound through it, corresponding exactly in position with the crackers in the bundle, is now laid on a amooth board, covered with finely powdered clay which is pressed into the holes in it, with the hand, until it is firm enough not to fall out when the piece is lifted. The surplus is brushed off and it is placed over the bundle of crackers so that the clay filled holes are exactly over the openings in the tubes. A slight blow is usually sufficient to cause the clay to fall into the crackers. Any not falling out is pushed out with a stick. The bundle is jarred slightly against the table to make the clay settle A scular operation is now performed with a thicker board containing slightly larger holes containing the powder charge after which the clay board is used once more is described above.

The top layer of paper is now moisreact so that is may be entirely removed and the clay which has become slightly constaned as well, is gently pushed down with a suitable rampor. It is then dried in the sun. The bottom end is now carefully dipped into water, turned bottom up and the paper removed from this lide also. the clay pushed down and pierced with an awl for the purpose of inserting the match of fuse. This is however not done until the crackers have been again dried in the sun. After the fuses are inserted the ends of the crackers are pinched around it, about 3" from the end, by a crimper or two blunt knives hinged together at one end and having a V, shaped notch cut out of the centre of each blade, so that when two notches approach from opposite sides they pinch the cracker together and cause the fuse to be held in place. When they are now finally dried for the last time they are platted together so as to form the packs of commerce. The platting and wrapping of the packs is such a dextrous performance that it is useless to try to describe it as it is only acquired by many years of succeeding generations doing the same thing.

The following formulas are in use for making the composition used in Chinese crackers and flash crackers:

CHINESE FIRE CRACKERS

	Parts.	Parts
Saltpetre	50	45
Sulphur	25	18
Charcoal	25	25
Chlorate of potash	-	8
Sand		4

MAGIC SERPENT

This remarkable substance consists of small pellets of sulphocyanide of mercury which has the remarkable property of swelling 25 to 50 times its original size when lighted, producing a long snake like ash. To prepare, make a concentrated solution of mercuric chloride and add little. by little a solution of potassium sulphocyanide, stirring constantly. A greyish precipitate will be formed and when the last drop of sulphocyanide added no longer produces cloudiness permit the mixture to settle. Drain off as much as possible of the clear supernatant liquid, remove precipitate to a paper filter placed in a glass funnel and wash slightly. When thoroughly dry reduce to a fine powder. Now moisten very sparingly with a weak solution of gum arabic to which may be added a pinch of saltpetre and form into cones.

PYROTECHNIC MATCHES

Pyrotechnic matches are otherwise known as Bengal lights. They are made

burning. Green and crimson lights are the most common and favourite. During Kare Puja and Dewali festival, these coloure matches are extensively fired by the children in almost all parts of India are they form safe and pleasing fireworks for them. Although the demand lasts for few days only, the consumption of same considerably big.

The manufacture of pyrotechn matches thus strictly forms a part of the fire-works industry. But it is allied ver closely to match making in every particul of its manufacture. The box making process is identical with that of safety matched The bottoms of the inner boxes, however are made thicker than those of safety matches.

SPLINTS

Splints used for the manufacture of pyrotechnic matches are made broader and flatter, and not square as those of safet matches. But they are equal in length and thickness to ordinary match splints. The flat sides of the splints permit of holdic more composition and spreading of same on the flat sides to give a bigger flame at the expense of the minimum quantity of wood. The flat splints are manufactured by increasing the feed of the pile of veneral in the splint chopping machine on interchanging the ratchet wheel and varying the number of steps turned by the ratchet

Paraffining is not required in the mainst facture of pyrotechnic matches. The application of the composition requires two separate dips in two different compositions the first being allowed to dry up thoroughly before the next one is applied.

The composition for the first dip is for producing the coloured light while that for the second dip is for the match head to me the former. The coloured-light composition is applied about two-thirds of the length of the splint and the match head

TYPICAL RECIPES

The following recipes are reproduced ere from the book entitled "Safety Matches" by Mr. K. C. Das Gupta.

RED LIGHTS

	Ī.	H.	III.
Potassium chlorate	40	20	15
Strontium nitrate	120	20	25
Sulphur	20	5	13
Lamp black	4	1	1
Chalk		1	-
Antimony sulphide	~	-	4
Glue	6	2	2
Shellac	8	2	3
Copal varnish	11	2	3

GREEN LIGHTS

	ſ.	II.	111.
Potassium chlorate	32	70	200
Barium nitrate	160	300	250
Sulphur	32	100	100
Lamp black	8	15	10
Barium chlorate		200	
Glue	7	20	13
Shellac	10	25	28
Copal varnish	5	10	8

SIDE PAINTING COMPOSITION

The following are some typical formusis of side painting composition as recommended by Mr. K. C. Das Gupta in his ook "Safety Matches".

Red (phosphorus) Black antimony	I. 40	II. 30	III. 64
sulphide	35	40	64
Manganese dioxide	~	10	,
Chalk	2	~	7
Potassium dichro-			
mate	2	10	
Glass powder	5	~	6
Asbestos powder	-		2
Glue	12	14	5
Gum arabic		-	14
Gum tragacanth	1		- 1
Destrine		~	3
Water	75	80	100

GENERAL PROCESS OF MANUFACTURE

The splints having been ready the match head composition is prepared. For this purpose take the glue and soak same in two to three times its weight of water and dissolve by boiling on water bath to a clean viscous fluid stirring all the time. Pass this through a sieve and weigh and note the loss in weight. Take hot water equal to this loss and wash the glue pot and the sieve and the washings into the strained solution.

Take shellac in a separate pot and keep it sorked for a few hours in double its weight of methylated spirit and keep it covered airtight as much as possible. Stir well when the shellac has gone into solution.

When the glue and shellac are thus dissolved and ready, mix the two solutions together. Shellac solution should be added gradually and not the whole quantity abruptly into the glue solution. Stirring must be done constantly while so mixing, and care should be taken to prevent thickening. Lastly add the copal varnish into this mixture of solutions and stir to a homogenous consistency. Then add the dry chemicals and grind the whole batch well in a conical mill when the composition is ready for dipping.

On dipping into the composition they : dried in atmospheric temperature and fanning. The drying is completed in out 12 to 24 hours' time according to the ciency of the drying arrangements. hen thoroughly dried, they are again sped into the safety match composition the usual way. The match composition generally coloured red by the addition Eosine and Rhodamine in very small oportions to the same rendering them form agreeable red tips. The match ads are then dried, the frames emptied d the matches are filled into boxes by elves in each. The boxes are then parled into dozen and packed into thin tin zinc sheet cases containing 10 dozen in ch when they are ready for the market.

BENGAL FIRE

Bengal fire is the simplest form of fireork, and simply consists of a moderately reely burning mixture containing suitable lts to impart colour to the flame, stronim and calcium being used to produce d, barium or copper for green etc. Many ferent mixtures can be used, of which e following may be considered typical:—

Den	

Potassium chlorate	15	parts.		
Strontium carbonate	15			
Shellac	7	11		
YELLOW				
Sodium nitrate	70	parts.		
Sulphur	20	,,		
Antimony sulphide	7	**		
Charcoal, powdered	3	**		
Green				
Barium nitrate	66	parts.		
Sugar	33	,,		
Shellac	1			
Brue				
Potassium chlorate	45	parts.		
Charcoal, powdered	5	**		

Mercurious chloride 35 parts.
Shellac 5 "

CONCLUSION

The handling of explosives, naturally, is never entirely free of danger. No more so is electricity, gasoline and many other things in daily use yet many persons have devoted long lives to the making of fireworks without having an accident. Even with the greatest care, however, accidents will occur to both those employed in making fireworks as well as those burning them. It is here endeavoured to point out the most fruitful sources of accident though obviously it is impossible to foresee every instance in which some carelessness or unknown factor may bring on disaster.

First, always keep separate places, a considerable distance apart to be used for making so-called "plain mixings" as rocket romancandle and gerbe composition containing sulphur, and the coloured mixings containing chlorate of potash. Separate sieves and utensils of every description must be employed and those working in the "plain" sections of the factory must not go into the rooms of those in the "coloured sections.

Second, keep in mind that very slight friction will sometimes start the burning of mixtures of finely divided chemical Star composition has been known to explode while being sifted, by scratching the brass wire sieve bottom with the finger nail, while rockets have taken fire from the brass solid rammer striking the top of the spindle while ramming.

Third, finely divided metals, when in contact with chlorate of potassium sometimes take fire suddenly. While fortunately this is seldm the case it must not be lost sight of. Even steel filings and iron borings frequently become quite warm when mixed with saltpetre etc. and rammed

from this action. The prevention of this has been explained under "Steel Filings".

Employees in the mixing and ramming rooms of factories should be required to wear rubber shoes whole at work and a constant source of danger is the carrying of matches. This cannot even be controlled by requiring the employees to change their clothes in the factory before going to work and having them wear garments without pockets as they will sometimes slip out for a smoke during rest hours and have matches secreted somewhere about their persons.

Small buildings should be supplied, about 12 feet square and not less than 50 feet apart all those engaged in mixing and ramming operations as well as for those making stars and as much as possible have one person to a room. Doors should be placed at both ends of work rooms and

Perterentiation to the control of th

should always open to the outside with no fastenings on the inner side but held closed, if desired, by spring hinges. Fire buckets, inspected daily should be on each buildings, supplemented by fire hose conveniently placed for emergency.

The most successful method of reducing the liability of serious accidents to a minimum is to keep at all times the least possible amount of composition on hand in the work rooms and to remove to storage of finishing rooms all tammed articles as quickly as they accumulate.

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-PHOTOGRAPHY AS A HOBB

DHOTOGRAPHY in these days finds its place in every department of life. It has always provided a thrill for the beginner. It is probably the same thrill that comes from the ability to make pictures, and which inspired primitive man to the desire for personal records of incidents, are all contributive to the wide use of photography. For the beginner there is the delight of seeing his first successes, negatives processed and prints made under his own hand, or it may be the scarcely lesser thrill of opening the wallet containing the results of his first exposures, because either through disinclination or force of circumstances he places the exposed film in the hands of those who do the mystereous "rest".

In carrying out the operation the photographer must equip himself with a range of subjects being photographed.

TARING AN EXPOSURE

The key to successful photography lies in correct exposure. The best camera, the finest quality of materials, and the highest skill in developing and printing are of little use unless the photographer realizes the importance of the part played by correct exposure.

By correct exposure we mean the period of light action on the film by the lens and shutter. It is necessary for the film to have sufficient exposure, but this must not be excessive. If the exposure is too short and "under-exposure" results, the negative will be thin and transparent and there will be no detail in the darker parts of the subject, resulting in black paper shadows in the print on the other hand if the exposure is excessive the result will be a negative in which the lights and shadows of the subject will not be seen in their

the print will lack what is turned "spark and vigour.

To explain this in another way, if subject is one composed of strong h lights such as the sky and deep shad under trees, it may be found that the sneeds 1/100 th part of a second, with deep shadows may need a whole seco. The other parts of the subject will ne exposures between these two extremes.

If the exposure of 1/100 th of a seccis given it is obvious that the sky will recorded and also some detail in higher lights, but there will be no derin the shadows, and these will be clear fill the exposure of one second is given the shadow the sky will be over-exposely 100 times.

Fortunately for the photographer the is another factor entering into the matt. This is the properly described as latitu of the film. It means in practice the although the sky might have received I times the exposure that it should have, it still possible to record it in the negative Plates or films respond better to over-eposure. The photographic image dependance upon the light action by exposure, a provided that the action is not excessive good negative is still possible. No chen cal process can supply the deficiency the image due to under-exposure.

With a film having a reasonal margin of latitude it is not a difficult matt to secure good negatives. The use of sor form of exposure-meter or calculator involved. This is simply a means arranging the factors controlling the eposure in their proper relationship, ar after so doing the exposure is indicated.

PROCESSING

The exposed films or plates are, mi

re said if it is in any way possible in favour of doing the work at home. It is is afe to say that no camera user who has a keen interest in his hobby is going to be satisfied with the work of other not because the resulting prints lack the technical quality, but because there is great satisfacion in doing the work for himself.

One of the reasons why many photopraphers place their exposed plates and ilms in the hands of the trade for procesing is because the operations involve a considerable amount of time. Actually this s not the case, for while the operations may be conducted in an unbroken sequence except for intervals while the negatives and wrints are drying. In order to show the apid way of developing and printing ilms and plates we are describing the implest and easiest processes in the development.

The process of development is that by which the action of light upon the sensitive ilm productive of an invisible or latent mages is revealed by chemical action as negative. This is done in the first stage by the use of a solution consisting of everal elements known as developer. There are many different photographic levelopers each with advantages to offer. These include Pyro, Metol, Hydroquinone. Amidol, Para-amido-phenol, and Glycin. These are used in conjunction with other hemicals.

- (1) Alkali, which accelerates the ation of the developer.
- (2) Preservative, sulphite, by which he developer is preserved while in olution.
- (3) Restrainer, potassium bromide.

 by which the activity of the developer is controlled.

There is no need for the inexperienced shotographer to investigate the claims of different developers. He is advised to surchase any of the well-known proprietory developers and to use it in accordance

with the maker's directions. It is certainly the best plan for the beginner.

The following methods of development may now be considered with their respective advantages.

TANK DEVELOPMENT

This method offers in some cases the important advantage of dispensing with the dark-room. The plates or films are placed in the tank, and the developer permitted to act for a certain time according to its strength, the type of plate or film, the negative required and the temperature of the solution. These times are given in the form of a table with the developer used.

It is admitted that the tank method gives the photographer a high percentage of successful negatives for the simple reason that it eliminates guesswork as to how far to carry development. The operation is reduced to an exact science. Tank development offers the advantage that the negatives are not handled more than is necessary, and this means freedom from the risk of mechanical defects.

TANK DEVELOPMENT IN PRACTICE

This is the most simple system of development, and at the same time is the easiest for the beginner. Modern tanks are easily loaded, and once the plates or films are in the tank the rest of the operations can be carried out in daylight. This system has been brought to perfection within recent years with regard to the design of the tanks for easy loading, and there is considerable improvement in the developers that are suited for use with them.

It was argued that tank development permitted the photographer no control over the result in the case of under or over-exposure. There was the belief, which died hard, that alteration of the composition of the developer allowed of incorrect ex-

posure being compensated for. Expert investigation has dispelled this idea. It is safe to say that a fixed period of development is one which, while based upon the assumption that a correctly exposed plate or film needs development for a fixed period, will allow the best to be made of under or over-exposure.

The fixed period of development is based upon the negative necessary for a given printing process. This is determined by the maker of the developer who in his experiments finds that for an "X" plate or a "Z" film the time of development is sixteen minutes at 65°F. This presupposes a correct exposure. It will also follow that the period of development which is correct for the film which has had correct exposure is also the best for those which have been incorrectly exposed. This was the system devised by Messrs. Kodak for use with their film tank designed to eliminate the need for a dark-room for the amateur photographer.

For the benefit of those photographers who have never watched a negative develop, it may be explained that the rate of development depends upon the exposure of the film. The under-exposed film develops slowly because of the deficiency of light action, the over-exposed plate or film "flashes up" in the developer instead of the high lights appearing first and the rest of image gradually revealing itself. It happens that the under-exposed negative is developed too far in the hope that a little more detail will be brought out, while the over-exposed negative is "rushed out" of the developer before it has had long enough to secure sufficient density. If this happens the negative is weak and lacking in the necessary contrast.

Therefore a fixed time of development based upon correct exposure avoids the risk of the under-exposed negative being image being removed too soon. While fixed period is in the nature of a compromisit is the best course, and the choice of the correct developer time gives the best negative, and the careful choice of a printing paper makes a good if not a perfe photograph.

For the loading of a developing tar the reader is referred to the direction issued with the apparatus, and care mube taken to see that these are followed exactly. If this is not done there is the rist of the developer not reaching the film properly, or in the case of a tank of the day light-loading variety which is in the nature of a mechanical device, there is the rist that the film may not enter the tank in the proper way, and in this case it is likely be spoiled.

It may be thought from the first reading of the instructions that the manipulation of the tank is a difficult matter, but this not so, and after the instructions have been determined the mechnism will become clear. After one or two films have been developed the will be no need to refer to the instruction sheet. Plate tanks are very simple to us the plates being dropped into the groow which hold them. Film pack, or cut fil exposures, are placed in the special holds which are provided for them.

Apart from the loading of the tar there are several other points which be upon successful work. The develope should be poured into the tank so that the plates or films are covered as quickly possible. Failure to ensure this may result in irregular development and marks on the lank should be filled with the developing solution first and the plates or films lower into it. It is important that the solution should be constantly agitated during the period of development or the same defect

are a problem, as they result in clear circular spots on the negatives. They are often the result of too vigorous shaking of the developer either in its bottle or in the tank. In some cases the design of the tank makes for the formation of air bells and patches of irregular density on the negatives, but this was more the case with some of the older patterns, where there was insufficient space between the negatives with plate-tanks which carry the strip in a celluloid "apron" for development. Modern tanks are superior to those of the older type and give no trouble in this respect provided that they are properly used.

The time of development is controlled by several factors: the type of film whether it needs a long or a short development, the temperature of the developer and its working strength, and, finally, the type of negative that the photographer requires for the printing paper to be used. This is all decided for the photographer by the makers of the particular developer used, and the photographer is advised to use one of the several proprietary developers which are suited to tank development. This resolves the problem of development to finding the group in which the plate or film is placed. and it will be found that at the temperature at which the developer is working the operation will be complete in a given number of minutes.

Care is necessary to ensure that the temperature of the solution is that recommended by the maker. It must not be lower than 50°F., because some developing agents lose their power at a lower temperature. On the other hand, a high temperature is to be avoided as this will cause a softening of the gelatine film, and cause the "grain" of the negative to be coarser.

PINE-GRAIN DEVELOPMENT

The user of a "miniature" or small camera needs to be more exacting in his requirements with regard to a developer for his films than is necessary with regatives

of larger size. It must be realized that the small negative is made with a view to enlargement, and it is essential if the large prints are to be satisfactory that the negative should be of the correct type. It is also very important than it should be of "fine grain". The photographic image is composed of very minute silver grains suspended in a film of gelatine. The size of these silver grains and the avoidance of their tendency to "clump together" determine the quality of an enlargement. The maker of the film does his best towards the provision of the essential condition, and modern films are a great advance over those of a few years ago in this respect, but in spite of the production of fine-grain film the photographer has to do his part with regard to exposure and development. A fine-grain developer is essential in the case of small negatives from which enlargements of great size are wanted. There are several excellent fine-grain developers, and some of super-fine grain. These should not be used by the beginner as their use involves extra exposure of the film, which is not always possible.

The fine grain developers supplied in this ready to be dissolved for use by almost all photographic manufacturers should be used.

Fine-grain developers also give the right type of negative for enlargement. For this the negative needs to be of what is termed a "soft gradation" type. It means that the black silver as representing the high lights of the subject must not be opaque, or the light from the enlarger will not penetrate the density, and the print will show white paper devoid of any suggestion of light action.

In this connection it might be pointed out that in some circles such attention is devoted to the subject of grain that the impression may be conveyed that the problem is difficult of solution. To put this in another way the impression is given that

The "grainless" emulsion has not yet been produced, but with modern films and fine-grain development no trouble will be experienced if care is exercised.

Grain, apart from the film, will be sufficiently fine to permit of considerable enlargement if the following points are observed:

- (1) The developer should be used at the strength recommended by the makers.
- (2) The solution should be used at 60° to 70°F., and no higher, and fixing-baths should be of the same temperature as the developer.
- (3) The developer should not be used to the point of exhaustion.

It is necessary to use a thermometer in order to ensure that the temperature is correct. When the subject is one that it is thought will demand a very large picture, one of the specially fine-grain films of lower speed should be used. High speed in a film is obtained at the expense of fine-grain.

The commercial fine-grain developers may be used for three or four films in succession or at intervals if properly stored. It is false economy to overwork the developer, because this will certainly involve some loss of quality.

FIXING

The next operation is that fixing the film. This is the removal of the silver that is seen in the creamy appearance on the back of the negative. If the film is examined in very weak light it will be seen that his creamy appearance begins to disappear, and in few minutes the negative will be fully transparent.

If the tank is made of metal an acid lixing-bath must not be used, as the acid would attack the metal plating. The only are course if the tank contains metal parts

that the plates or films be removed fro the tank after the developer is washed fro the film, and fixed in a separate vessel.

The tanks made of bakelite or similmaterial are unaffected by the chemica used.

It is very important that fixation should be complete. The creamy appearance of the negative is a partial guide, but the ball should be allowed to act for at least as lor again. Films and plates vary with regard to the time taken for the solver to fix out with some it takes place more rapidly that others. An acid fixing-bath with a hard ening element is to be preferred to a plan hypo bath, and most photographers use the acid bath. If the photographer prefers to make up his own fixing-bath the following is a good formula:—

Hyposulphite of soda
(hypo)
4 ounces.
Water
20 ...

The hypo will dissolve more readily a warm water, but it must not be used unticold.

An acid fixing-bath is made up .. follows: -

Hyposulphite of soda
(hypo)

Potassium metabisulphite

phite

Water

8 ounces.

2 ounces.

In hot weather it is a good plan to use an acid fixing-bath which exerts a harden ing action on the film. It will prevent the possibility of frilling, and assist in avoiding mechanical damage to the film in its we state. The bath is made up as follows:—

Hyposulphite of soda

Potassium metabisulphite

phite

Chrome alum

Water

1 b.

1 ounce.

1 ounce.

40 ounces.

To make up this solution the hypo is dissolved and the metabisulphite added. Hor water should be used, and the solution

ived in ten ounces of water and added to a remainder of the bath.

If the photographer does not wish to to the trouble of making up his own dutions the acid fixing salt, sold by all notographic dealers, will meet the case.

When the fixing is done in the tank, ashing may follow without the removal the film. This will serve to clear the tank hypo, and it will only need a rinse with arm water before using again. Many 10tographers make a practice of developg, fixing and washing in the tank, and ey do not see the negative until they are ady for drying. The beginner will proably not be able to resist the temptation see what his negatives are like for as long this. If the film is developed in a tank hich holds it in the grooves of a spiral, it ill not be possible to reinsert the film withit risk of damage. Plates and cut films, id the films developed in a tank which olds them in a cellouloid "apron", can be spected and returned to the tank quite ısily.

WASHING

This is a mechanical operation but one lat is too important to permit of carelessess. Films that are developed and fixed the tank are best washed in the same ink, and this also applies to plates. Roll ms that are developed in the strip should washed by pinning the ends together ith the celluloid side or the back of the lm inwards. The film is then placed in large bowl or similar vessel. Films if not trolled as described will coil up, and the ater has little effect on the negatives on the inside of the roll.

Efficient washing does not demand a rige quantity of water; in fact, those workers who use the most water are not those ho do this part of the processing most ffectively. The point is the hypo is easily emoved from the film; it is heavier than he water and sinks to the bottom of the

wessel. It must be removed or the film will be simply subjected to a prolonged soaking in what is a dilute hypo solution.

Running water is preferable to washing in a series of changes, but the hypomust be drawn off from the bottom. If the water is simply allowed to pour in at the top of the tank or vessel and runs over, this is not removing the hypo-charged water at the bottom. In these case it is necessary to remove the film, allow the surplus water to drop or, remove the water from the bottom of the vessel, preferably by rinsing it, and then to replace the film in fresh water.

The same result is obtained by giving the film six or seven changes of water, each change lasting from four to eight minutes. A series of short changes of water is far more effective than indiscriminate use of running water or prolonged soaking; the latter especially is to be avoided as it has a bad effect on the film.

DRYING

After washing the surface, the negative (in the case of films the back or celluloid ide as well) should be rubbed lightly with a tult of cotton-wool. This will remove my deposit that may have accumulated from the washing water. It is sometimes necessary to give negatives a final bath of 1 per cent, acetic acid, in order to remove the lime salts present in some water, and which dry in the form of scium on the film and are difficult to remove afterwards.

Plates or cut films are given two minutes in the acid solution. Films are see-sawed three times through. A final rinse of five minutes should follow, after which the negatives are surface-dried either with a soft chamois leather or "viscose" sponge and set up to dry.

Plates are best stood on a shelf in a warm room. Films are best pinned up to a shelf where they will not come into con-

set with anything while drying. In the ase of roll films it is a good plan to attach weight to the lower end of the strip while lrying, as this will help in counteracting the tendency of the film to curl.

While a warm room is advocated, heat must not be applied as this will cause the gelatine film to melt, while it may affect the "grain" of the negatives adversely.

AFTER DRYING

Photographic negative are necessarily delicate and easily damaged by misuse. After drying they should be put away from dust, damp or careless handling. Plates may be stored in the boxes in better still in the commercial negative albums sold for the purpose. Miniature negatives are best kept in the strip or cut into short lengths of four or six.

PRINTING

The making of the negative is only a stage in the production of a photograph, although a very important one. The quality of the negative has a considerable effect on the print, for not only is it a fact that the perfect print can only be made from the perfect negative, but also the size and the type of print are limited by the perfection or otherwise of the negative. Moreover, the negative must be of the right type for its particular purpose, for while a negative may be described as "good", it might also be added that it may be limited in its range.

In these days with the wide range of printing papers obtainable it is possible to make passable prints from almost any negative, but these are often imperfect judged from the more critical standards. The best photographs are those made from correctly exposed negatives in the first instance and developed to suit the printing process to be used.

For an amateur photographer the print-

In this method the paper to be printed is expected in contact with the negative. This means that the print will be of the same size as the negative. There is more scope when contact prints with regard to the method of printing to be used. Prints may be made upon gaslight or any of the wide range of bromide papers, or they may be made by daylight upon any of the printing out papers and self-toning papers.

Contact printing can be done in a printing box which is fitted with an electric light for exposure. A glass top is fitted to take the negative, and this is laid in contact with the printing paper on the glass the light switched on by pressure of a backboard, making the exposure. This is both rapid and convenient. Printing boxes of this type for lighting from the mains as well as from a battery may be bought from photographic dealers.

If the printing box is not considered necessary a printing frame must be used For plates this should be of the same siz as the negative for plate negatives, but fo films it is convenint to have the frame size larger than the negative, especially it is desired to give the print a white eggle for which a mask to protect the edges from light action is necessary.

For making prints by contact on bro mide paper the test strip is advised, the printing frame being placed at a fixed distance from the light and the frame graduall uncovered so that the negative receives exposure of five, ten, fifteen and tewent seconds.

The printing lamp should be switched to operate independently of the drak-root light, and it should not be too strong, a 25 watt pearl lamp is quite powerful enough

PRINTING WITH GASLIGHT PAPERS

Contact printing is advantageousling done by gaslight papers because they ar less sensitive and drak-room is not neces

room. These papers have not the dof bromide papers, and print making ather a longer process because longer e is needed for exposure. On the other id, prints on these papers develop more odly.

Etamone ist

Gaslight papers develop more rapidly in bromide prints. The image in the forr case appears very quickly, and a prorly exposed print is fully developed in
s than a minute. The image appears, and
the case of a correctly exposed print it
ll seem to stop, and the print is then
ised and placed in the fixing-bath. If
print is over-exposed the picture will
ash up" in the developer and darken over
pidly. If it is rushed off the developer in
e hope of saving it the colour will be of
sty black instead of the cold black.

It is important that the print should be used between developing and fixing, herwise stains mat appear that are fficult to remove. Care must be taken at to use the developer to the point of extustion, and to keep prints under the flution. If the developer is exhausted the ints will be of poor colour and liable to ecome stained, and the same happens if a film is exposed to the air in the fixingath, especially before the silver has been seed out.

Thorough washing is also necessary. rints on gaslight paper may be regardl as reasonably permanent, provided at they are properly fixed and washed ee from hypo.

Finally, with regard to the parmanence f both bromide and gaslight prints, it may e stated that efficient fixing is of greater aportance than washing.

A small quantity of hypo in a print oes little harm until it begins to decompose prough the action of damp.

Provided that the print is stored under ry conditions it will last for many years.

NEGATIVE PAULTS AND THEIR REMEDY

Until experience has been gained there may be failures, and it is well that the cause of these should be ascertained with a view to prevention in the future. The following are the failures most commonly met with.

Under-exposure. — This is indicaded by the fact that the image is a long time appearing. After development the negative is "thin" and transparent and there is little or no shadow detail, it being almost clear film.

Over-exposure.—The negative is dense and the shadow detail is almost as strong as the high lights. The sky will be thin due to excessive exposure.

Under-development. — A. Following correct exposure. There is a mere trace of image.

Remedy-Intensification.

B. Following under-exposure. A weak image, shadows transparent.

Remedy-Intensification effects slight improvement.

C. Following over-exposure. The negative lacks contrast, the shadows almost as strong as the high lights.

Remedy—Slight reduction makes partial improvement.

Over-development. — A. Following correct exposure. The negative shows detail in high lights, but they are too opaque to print. The shadows show too much detail.

Remedy-Reduction.

B. Following under-exposure. The negative shows detail in the high lights and shadows, but the former are much stronger than should be the case. It must be noted that the effect of over-development may be compensated for by the choice of a printing paper of a different grade, and what may be an over-developed negative for one paper may not be so for another.

Remedy-Reduction effects slight improvement.

C. Following over-exposure the negative lacks "contrast" or proper balance between the high lights and shadows, which results in a flat print which fails to give the gradations of the subject.

Remedy-Reduction.

OTHER DEPECTS IN NEGATIVES

White Circular Spots (small)—These are termed "pinholes," and are generally caused by minute particles of dust on the film which prevent light action.

May also be caused by undissolved particles in the developer becoming attached to the film immediately the developer is applied and preventing action.

White Circular Spots (large).—These are generally caused by air bells becoming attached to the film and preventing the developer from reaching it. They are removed by spotting the negative with opaque colour.

Scratches. - These are serious defects. and especially in the case of small negatives. The cause should always be traced with а view to future prevention. Film sometimes have scratches running across the negative in the direction in which the film has been wound. These are termed "telegraph-wire scratches." There are several possible causes. The first is dust or particles of grit on the surface of the back frame of the camera across which the film travels, or roughness on some part of the apparatus over which the film runs. These are sometimes met with in film-pack negatives.

Winding the film with the camera closed will also cause scratches across the negatives. With some cameras there is very little space between the film and the folded bellows, and if the film is wound

Twisting the film on its core in order to exclude light is a practice of some workers, and is to be deprecated. Ar good camera will ensure that the film tight enough, and if the spool is sealer after exposure, and not subjected to the action of strong light, there is no fear a fogged negatives.

SCRATCHES ON THE WET FILM

Scratches on the film while it is a wet state are easily recognized, and ther is no need for them provided that the fil is used carefully. Roughness on the surface of the developing tank or the washin vessel will cause scratches on negative and also fine particles of grit on the surface of the sponge of chamois leather used for drying the surface of the fil after washing, previous to drying.

INTENSIFICATION AND REDUCTION

It will be realized that if the photographer has devoted a reasonable amour of care to exposure and development should not be necessary to apply an chemical process to the negative with view to partial compensation for shortcomings in one respect or the other. With the wide range of bromide and gaslight paper it is possible to do as much or even mor than can be done by chemical after-treat ment and without the risk that is inevitable when a negative is rewetted.

The two processes by which a negative is modified are known as intensification and reduction. Both are chemical processes, the one adds to the density of the imagalready produced, the other reduces it.

Intensification will be considered first. There are several methods, but the objection to them is that they involve the use objection to them is that they involve the use objection to them is that they involve the use of highly poisonous mercuric salts and for that reason they are not advocated. The best intensifier for amateur use is that

tion of bichromate of potash, or hydrochloric acid. Actually chromium is added to the silver image of the negative. Washing follows and the negative is then placed in a non-staining developer. This method is simple and effective and avoids the use of highly poisonous chemicals. It should be realized that the effect of intensification is strengthened the image already there. It will not reveal any image not produced owing to deficient light action.

The following is a good formula:-

A. Potassium bichromate, 1 oz.
Water 20 ...

B. Hydrochloric acid 2 ...

Water 20 .

For use take equal parts of each and a like quantity of water.

Intensification to be successful requires that the negative should be well fixed and thoroughly washed. Neglect of this will cause stains which are not easy to remove. The process may be carried out after the final washing, and this is the best time to do it as the negative responds better and the risk of rewetting the film after it has once dried is avoided. If the film has been dried it should be soaked for twenty minutes before bleaching.

The solution prepared, the plate or film is placed in a clean dish and the solution poured on. The dish should be rocked. The film will be seen to bleach to a yellowish brown colour, and if the negative is examined against a dark object the picture will be seen as a positive (print). The operation should be carried on until the full positive is seen. This takes from three to five minutes. The operation should be carried out in subdued daylight or artificial light, not in strong daylight.

The negative must then be washed until it is free from the yellow stain. This is important and the bichromate stain is persistent. If it is desired to finish the negative quickly a few grains of potassium

metasulphite may be dissolved in two or three ounces of water and applied to the negative. This will remove the stain at once.

After the yellow stain has been discharged the negative is placed in a non-staining developer. It will darken over almost at once, but the devloper should be given full time to act or the maximum effect of the process may not be obtained. This should be done in strong light and at least five minutes allowed. No fixing is necessary, the negative being washed for about twenty minutes and dried.

The success of this method of intensification can only be judged by making a print, and it often has a greater effect than may at first be thought.

REDUCTION

This consists in dissolving some of the acquive image so that the contrasts of the negative are better and their result of over development corrected. There are two reducers, both of which may be obtained ready prepared—the best course, as the process, like intensification, is used but seldom.

The persulphate reducer is useful because it improves the contrasts of the negative by removing the detail. The Entire reducer (ferrievanide and hypo) by acting first on the shadows will improve a negative which has been over-exposed and over-developed. The latter is more certain in its action than the persulphate.

All that is necessary is to place the negative in a clear dish and to pour the solution on. It should be stopped immediately the action has gone far enough in the case of the persulphate by placing the negative in a solution of sodium sulphite. The Farmer reducer is arrested by washing. These reducers are best bought ready, prepared.

-PHARMACEUTICAL RECIPE

COMPOUND POWDER OF KALADANA

Kaladana, in fine powder Potassium acid tartrate fine	700 ely	grams.
powdered Ginger, finely powdered Mix	700 600	19
Dose: 60 to 90 grams.		

LIVER PILLS

Podophyllin	⅓ gr.
Rhubarb	24
Extract of hyoscyami	2 ,,
Mucilage of tragacanth	q. s.

Triturate the ingredients in a mortar and make into a stiff dough. Then make into pills. The above composition is sufficient for one pill.

WHITE ANT KILLER

Orthodichiorbenzal			24	part	8.
Solvent naphtha			45		
Betanaphthol			4		
Rosin			4		
Rect. spirit			7	74	
Mix all together and	keep	in	air	tight	in
ersion boitles.					

INDIGENOUS TONIC

Gulancha	1	dr.
Chirata	1	11
Ginger	1	
Water	1	pint.
Boil down to half.		
Dose:1 ounce after fever as	a foni	ie.

CATARRHAL INHALANT

Menthol	320	gr.
Pine oil	160	mins
Lavender oil	80	**
Cinnamon oil	30	**
Origanum oil	144	**
Eucalyptus oil	120	11
Liquid formaldehyde	40	,,
Rectified spirit	8	OZ.
Mix.		

GLYCERINE SUPPOSITORIES

Glycerine suppositories are very much used to produce faecal discharge in constipation. They act by locally irritating the mucous membranes of the rectum, and are often satisfactory, though never really purgative. As an occasional remedy they are useful but their habitual employment is probably injurious to the mucous membrane.

Gelatin, cut small	14	grains.
Glycerine	70	. W
Distilled water	16	**
The material and a second of		

ed on a water-bath until the gelatin has di ed and the contents of the dish have beer porated to a definite weight, which correst to 70 per cent. by weight of glycerine.

When the mixture has arrived at the or weight, allow to stand for two or three mix remove the scum that rises, and pour slightly oiled moulds.

The liquid mass is poured into m having a capacity of 15 grains (for infi 30 grains (for children), 60 grains or 120 g (audit's medium or large) as may be requ

In moulding the suppositories it utmost importance to lubricate the mould almond oil applied on cotton-wool and i the mould so that any excess of lubricant drain out. By doing so the moulded mass not stick to the surface of the moulds.

PEVER AND AGUE MIXTURE

Quinine sulphate	- 1	ďι
Sulphuric acid dil	1	,,
Syrup of orange	6	Z
Olyccrine	4	đι
Distilled water to make	8	0

Dissolve the quinine in the sulphuric and then mix with the other ingredients. I add the water to make up the required vo

TINCTURE BENZOIN COMPOUND

Benzoin, in powder	100	grar
Storax	75	
Balsam tolu	25	
Aloes	20	
Alcohol 90 n c to make	1000	C. C.

Macerate the benzoin, storax, balsam and aloes with 800 c. c. of alcohol in a c vessel for 2 days, shaking occasionally; pass sufficient of the alcohol through the to produce the required volume.

MOUTH WASH TABLETS.

Sodium bicarbonate	8
Saccharine	1
Vaniliin	20
Coumarin	20
Acid benzoic	20
Oil cloves	- 4
Oil caraway	į
Oil Iemon	4
Oil gaultheria	į.
Oil menthol	- <u>1</u>
Acid carbolic	4
Oleo-resin capsicum	į.
Carmine	20

Mix, granulate and make into 5 gr. ta One to be dissolved in half a wine glassi water and used as a mouth wash.

The basis for the mouth wash to

-Recipes for Small Manufacturers

FLOOR POLISHING WAX

Spermaceti	4	OE.
Hard paraffin	4	ad
Talc	8	

Melt the spermaceti and hard paraffin gether over slow fire. Then remove the turce of heat and add the tale with stirring atil thoroughly incorporated with the mixture. Then cooled reduce the product into a granuar powder. Pack it in perforated container, ith directions to sprinkle on the floor.

TELEPHONE DISINFECTANT CLEANSER

Thymol	1	gram.
Pine oil	15	drops.
Peppermint oil	15	11
Alcohol, denatured	5	e. e.
Tincture of green soap	10	**
Water to produce	50	*1
Mix.		

LABEL VARNISH

Sandarac	6	06.
Mastic	4	Pr
Venice turpentine		grains.
Alcohol	16 1. arrivatus	fl. oz. mtil sob

Maccrate with repeated stirring until soin in is effected, and then filter.

TABLE SAUCE

Minogan	1 qu
Vinegar	2 (0)
Powdered pimento	1 dr.
Powdered cloves	1
Powdered black pepper	2 07.
Powdered mustard	i de.
Powdered ginger	2 64
Common salt	-
Shaliots	3 .,
Tamarinds	3
Sherry wine	t pin'
Capsicum	1 dr.

Mix all together, simmer for 1 hour is a strain it, and fill in bottles.

This sauce is never quite clear; stragge to remove the coarser particles is all of all necessary.

DEPILATORY SOAP

2/2/4		
Coconut oil	907	260093
Caustic Potash lye 33 p. c.	1915	٠,
	1844	,
Castor oil	453	
Glycerine	113	
Starch	907	
Sodium sulphide	2	dr.
Citronella	ú	ar.

Put the castor and coconut oil in an 170) pan over a moderate fire. Then pour the glycerine. Apply heat and when the temperature in nearly 100°C slowly stir in the causife not glyc. Continue heating and stirring until the whole of the mixture is saponified. Add water if required. When the soap has been prepared,

remove the pan from the five and incorporate the starch, and the other two ingredients. Allow the mass to cool and then cast into cakes of usual size.

TRANSFERRING PHOTOS TO CLASS

Where it is defined to transfer photos to glass for display purposes to the following process may be on it, united by the distributions are should give excellent and the display estimately of the display primary glycomus, preparation, condited can be made up with a destination.

Glycerica	1	68,
Colatia	1	
With r	8	
Alcol of	3	.,

Dissolve the relating in the water with gentle heat, add the alycerin and pour the mixture slowly, with thorough mixing into the at chol.

Photometry channel glass and unmounted photo, without printing or writing on the backs, must be used. Unwithe solution in the glass and ideas the thiefo, face down, on the glass and near on there of the olution, Excess should be tentive I to prevent buildle formation. Allow to it the photograph when it is die will be to use to the photograph when it is die will be for the of and hard be coloured at desired with out pends.

CARREST THEXIBLE LEATHER VARNISH

the first versical may be prepared	cred as	tollows:
- 14:	100	p n 5.
G nu saud uac	25	14,
Vene a furgentine	25	o.
Late Toetti	25	111
C. for all	20	**
Nigosia (Spirit (duble)	15	**
Tellistated aprilt	(40)	•
1		4.0 1 4

Three the ingredients in the methylated point and shake at intervals until disolved. I cally attrict through linear and bottle for use.

NAIL GNAMEL

	100	Jb4.
Acetone	200	,,
Bath andato	200	,,
United Jackston	100	1+
Dibuyl philadate	ţ	-H - 02.
Prenyl court alenial	2,	O.A.
Pallalose narati		$\mathbf{q} \rightarrow$
Posine (alcelodic obuton)	in a 5	olution

this olve the cellulose nitrate in a solution of acetone, but I acetale, and ethyl lactate. Add the dibutyl phticalate and lically tag phonyl ethyl alcohol and the colour solution.

When preparing the above articles be careful to have no flame near as some of the ingredients are very inflammable.

-IN THE FIELD OF INVENTION

IOTO-ELECTRIC CELL CONTROLS SHEET-FOLDING MACHINE

Of considerable interest to mill managements a recent application of the photo-electric cell control the folding of sheets. The equipment, stalled on the premises of James Bentley Ltd., Wilmington, Kent, and designed by Mr. K. ntley, a director of the company, is used to atrol the folding of laundered sheets twice in same direction, an operation which was presusly done by two girls but which is now done tomatically by the machine.

Each sheet is fed forward from an ironer to a number of parallel moving webbing belts, hen it has moved forward a few inches, the ding edge of the sheet intercepts a beam of ht falling on to an osram photo-electric cell d thereby operates a row of pneumatic gripers arranged across the path of the sheet. These ppers hold the leading edge of the sheet and se it slightly above the belts and, as the reduced of the sheet is still moving forward, old is created. When the trailing edge of the set uncovers the light beam, a relay mechant releases the gripper fingers and the two ses of the sheet fall together, a perfect folding completed.

The sheet then moves forward to a second oto-electric cell and gripper fingers and anier fold is made in the same way. At this int the sheet is folded "long and narrow" and, the operator removes it from the folder, she res it the last transverse fold by hand. Althoh this machine is used in this case for the ding of sheets, the same principle could easily applied to the folding of other textiles, paper, therefolth, etc.

A second application of the photo-electric 1 in this laundry is of particular importance the present time in that it results in quite estantial fuel saving. After the washing icesses, the clothes are passed through a dry-; room heated by means of a steam radiator ed with a fan. A light beam is arranged to piects across the room on to an Osram photoctric cell and, as long as the beam is obscured clothes passing around the room on the conyor, the fan continues to run. If however. ere is an interval between batches of work I the beam is unbroken, the photo-electric I stops the fan. This leads to a substantial p in the steam consumption of the radiator. en more clothes come along on the conveyor · fan automatically restarts.

-TEXTILE RECORDER.

TVERSAL WATER BATHS

Both large and small laboratories will preciate the advantages of thermostatic water has which, when used with appropriate racks attings, are suitable for a number of purposes. In standard sizes of baths cover the research of the majority of laboratory tests.

The temperature range is from room temperature, or slightly below when the cooling unit is used, to 100 deg. C. Deviation can be thermostat working in conjunction with a hotcontrolled within 0.5 deg. C. by a bimetallic wire vacuum switch. The tubular immersion heater, which is distributed evenly over the bottom of the bath, gives rapid response and uniform temperature distribution. Correct immersion for any test can be obtained by varying the water level and by adjusting the height of a strong perforated shelf fitted inside the bath.

-CHEMICAL PRODUCTS:

NEW GLASS FILTERS

A new series of glass filters of Czechoslovakian manufacture have recently come into use, and a few practical details concerning them may therefore be of interest to those working in hygienic, analytical chemistry, etc.

"Sifrital" glass filters are of such a strength as to withstand an underpressure of 1 atmosphere under normal working conditions. They are available in five grades of porosity, the finest having an average pore diameter of from 5 to 15 microus; it is thus able to meet all requirements of the most minute analytical work.

These filters are manufactured of highly resistant "Sial" glass and therefore withstand most thermal, chemical and mechanical influences. They may be placed, without being preheated, in drying ovens e.g., with pads of "Sial" glass and exposed to temperatures up to 150 deg. C. It is advisable to filter alkaline solutions cold, while acids and even concentrated acids should be filtered at temperatures up to 300 deg. C. Without preheating, the optimum temperature is 110 deg. C. New filters should first be flushed with hot hydrochloric acid and water in order to remove impurities, dust and glass particles.

Sediments are removed from "Sifrital" filters by chemical means, and the final washing is done by flushing with tap water from the reverse side. To achieve perfect cleanliness suitable solvents are employed, such as carbon tetrachioride for fats, hot ammonia or hydrochloric acid for albumins, hot sulphuric acid with potassium dichromate or sodium nitrate and sodium chlorate for organic matter, hot hydrochloric acid and potassium chlorate for cupric oxide, hot nitric acid for mercury, and ammonia or sodium thiosulphite for silver chloride. Allighu tubes should be cleaned with hydrochloric acid and potassium chlorate.

Spare filters are cemented to their base by means of such cements as litharge, glycerin. sulphur, kaolin, water glass, zinc white.

"Sifrital" filters, which are particularly useful in minute analytical work, microbiology and microchemistry, are manufactured by Glassexport, Ltd. of Prague.

-FORMULAS, PROCESSES & ANSWERS

WOODEN BATTERY SEPARATORS

686 N. C. B., Dacca--Desires to know how wooden battery separators are made.

The separators, after manulacture, are given a chemical treatment to remove all the volatile acids, and to get rid of tannins and resinous matter as far as possible. The treatment consisted in boiling the separators in 103 aqueous solution of caustic soda for 2 hours, tollowed, by one hour's boiling in distile i water, with an intermediate washing to remove the colouring matter sticking to the separators Lastly, the separators were thoroughly washed with the water till no trace of alkali was left. The separators were then fitted in the cells and made ready for test. The separators made of imported Port Orford cedar were used without any chemical treatment.

With Talauma phellocarpa, it was found that a second treatment in 1 % caustic soda solution was necessary in order to remove most of the colouring matter present in it. It was also noticed that, this second boiling in caustic soda solution, rendered the separators a little more flexible than when only one treatment was given.

The details of an alternative chemical treatment evolved by the Chemical Branch of the Forest Research Institute, are given in the following paragraphs. Batteries litted with separators treated in this way are still under the test in the Seasoning Section. The improvement, if any resulting from this longer chemical treatment, will only be known after some time, and the results will be reported in a labor publication.

"Separators made of the Indian tumbers under test were boiled in 2 % aqueous solution of caustic soda for 3 hours, after which period. it was observed that practically the whole of the aikali had been neutralised, and that the colouring matter had not been completely removed from the separators. The separator, were then removed from the hot solution. washed and again boiled in fresh solution of one per cent caustic soda for 2 hours. Except in the case of Adina corditolia, the operation had to be repeated a third time (1 % causing Loda) with all the other species till the solu tion extracted no further colouring matter. The separators were then removed from the bath, washed in water and boiled repeatedly in distilled water, till the last trace of ancali was removed. These were then drained and superficially dried by interposing a blotting paper and pressing under a hand press. The separators were then given a dip in a bath of glycerine, to which had been added a small amount of an antiseptic (Rosha grass oil | thymol 2: 1) at 105° -- 110°C for about 15-20 minutes. The separators, after draining off the glycerine, were washed in running water for a few minutes and stored, while wet, by wrapp ing in waxed paper.

In order that the treated separators may retain sufficient moisture, even after exposure in air, this glycerine treatment has been found necessary, otherwise they are liable to warp and crack on drying. This step, also, help to keep them flexible and treserves their phublity. The addition of essential oil is an antiseptic application in order to prevent fungus growing on the separators, while kept moist, in storage

RYDBAULIC BRAKE PLUID

С.		
Classin Encetone crythritol	50	parts.
Valuether Calor off No. 1 Mix.	10 10	0Z,

CLARIPYING CASTOR OIL

To clarify easter oil taix 100 parts of the oil it had be with a calture of Upart of alcohol this per cent and E part of subpartic acid. We are cettle for 24 hours and thea carefully design them the per partic. Now wash with some acide, bothing for Unious, allow to settle for the are, but in a well closed vessels, after which there is go, deed oil may be taken off.

LOOIU PASTE

1111 I M.S., Bareilly -Wishes to have a

the of teach Chileren.		
a recipitated chalk	6	oz.
the a root (powder)	- 1	19
Magnesona curbonate (heavy)	- 1	11
sage payder	1	
Thymol	10	
Cardypers off	20	mins.
afethyl safeyfate	20	10
Glycerin	1	02,
Stangle Syrup	- 1	19
Water	1	9. 8.

Mix the glyceria, simple syrap and water. Next mix together chall, ordis root, and magneount emborate.

Now pour a sufficieta quantity of the solucoa into the mixing sachine. The powder mixture is next added madually the right dence a consistincy being maintained by the orequent addition of burther quantity s of exchpient. When the parte is nearly finished add the mixture of themed, earth I salicylate and exceleptus oil. The cosp is added last, when the cream will immediately become very soft. The "machine" is allowed to work until even distribution of all the constituents has been attained. The product is then forced through a fine sieve to remove grit or tumps of conscaled soap, etc. As the paste contains a lot of air bubbles, it is allowed to stand a few hours and then filled in collapsible tubes.

AFFERT ACID

3147 H.S.M., Oulberga—Wants to have a recess of making battery acid.

The electrolyte for accumulators must be sulphuric acid of suitable densities depending a its ampere-hour discharge. The amount of lution or specific gravity of electrolyte, when he batteries are fully charged, should be about 190 to 1.225 at 60°F. for power station sells, tough in motor car batteries densities of from 270 to 1.300 are often used. To prepare the cid solution of a particular density take a uantity of distilled water in a glass or glazed arthenware vessel of sufficient capacity, then radually add the sulphuric acid stirring all the fails with a clean wooden stick. Heat will deslop due to the chemical action. Now allow to mixture to cool before pouring into the slis.

After cooling, the specific gravity will be und than while hot, and the careful addition a little water may be necessary to bring the quid to a proper density.

USTRE POLISHING BAR

1228 S.B., Moradabat—Desires to know rmulas of making lustre polishing bar, etc.

Tallow	1	lb.
Red ferric oxide	2	OZ.
Oxalic acid	3	dr.
Pumice powder	2	02.

Powder the acid, mix with oxide and pumice pwder. Then incorporate into the melted allow. Lastly press the mixture in suitable woulds. The oxide and pumice must be quite the from grit, or it may produce scratches on the surface of polished metals.

EERLESS POLISHING STICK

100 lb. oleo-stearine and 20 lb. of doubleressed stearic acid is placed in a kettle and lelted by being brought to a temperature ightly above 130 degrees F.

To this hot mirture, add five lb. of tricitaolamine and allow the resultant mixture to and, while still hot, a sufficient time for lorough commingling and to enable the chemili reaction of saponification to be completed.

The above mixture is fed into a suitable sixing machine, which has been previously eated, and there slowly commingled with 220 s. of tripoli powder and 180 lb. of powdered int, this mixing operation generally requiring bout one and one-half hours. The compound i transferred to suitable moulds in which it sllowed to solidify and harden into cakes of

PAPER BAGS

CONTRACTOR DE LA CONTRA

"Greaseproof paper bags for wafers and massalas, and Sulphite paper bags for tea coffee, distemper and other industries, made to your sizes."

D. DARASHAW & CO., 24, Jambulwadi, Bombay 2. suitable size and shape for convenience in application to buffing wheels.

JEWELLER'S ROUGE

Green vitriol (crystals)	50	parts.
Nitrate of soda (pure)	25	**
Common: salt	18	P9
Sodium sulphate	18	44

Pulverise the ingredients separately. Then mix the green vitriol, saltpetre and common salt, stir the mixture with water to a thin paste and boil down the mass in an iron crucible to dryness. Now heat the mixture thus obtained in a hessian crucible at a red heat until it becomes quiet and homogeneous. Then pour it out and when cool, powder, boil with water for a few minutes and wash. It is advisable to somewhat elutriate the powder thus obtained to eliminate grains of sand which may have reached it from the crucible. Finally collect the powder upon a cloth and dry.

DOUBLE SULPHATE OF NICKEL AND AMMONIA

The Double Sulphate of Nickel and Ammonimu may readily be formed by dissolving oxide or carbonate of nickel in dilute sulphuric acid (1 part acid to 2 parts water). The resulting solution is then to be neutralised with ammonia and crystallised. To each pound of the dry crystals add 1 pound of pure sulphate of ammonia, dissolve the mixed salts, evaporate the solution and re-crystallise. Cube or grain nickel may also be dissolved in a mixture composed of 1 part sulphuric acid and 2 parts water, with the addition of a small quantity of nitric acid, moderate heat being applied as before. The solution is then to be evaporated and set aside to crystallise, and to convert the sulphate of nickel into the double salt, sulphate of ammonia is to be added in the same proportion as before; the mixed salts must be dissolved, filtered, and crystallised.

ETCHING POWDER

1235 R.K., Jullundur City—Wants to have a recipe of etching powder.

Etching powder for metals like tin, silver, iron, german silver, copper, and zine may be prepared by mixing:—

Blue vitriol 1 part.
Ferric oxide 4 parts.
Mix. This mixture may be moistened and applied to the places to be etched.

DRAGON'S BLOOD

Dragon's blood is a kind of red resing obtained by evaporating the fluid which exudes out of freshly cut canes and rottans. This is however, for the most part prepared from the fruits of several species of calamas, met with in Eastern Sumatra, South Borneo and Penang. The gum exudes naturally from between the scales of the fruit, but inferior qualities are obtained by boiling the fruits or by tapping the stems.

METPICIAL MARBLE

1335 K.M.T.F., Mohim-Wants to have a

scipe of making artificial marble.

Alum, 1,000 parts; heavy spar, 10 to 100 arts; water, 100 parts; the amount of heavy par being governed by the degree of transluence desired. The alum is dissolved in water rith the use of heat. As soon as the solution wils the heavy spar is mixed in, stirred with vater and the pigment; this is then boiled lown until the mixture has lost about 3 per cent. if its weight, at which moment the mass exnibits a density of 34°Be, at a temperature of 12°F. The mixture is allowed to cool with constant stirring until the substance is semiiquid. The resultant mass is poured in a mould sovered on the inside with several layers of collodion and the cast permitted to cool completely in the mould, whereupon it is taken out and dried entirely in an airy room. Subsequently the object may be polished, patinized, or finished in some other way.

PREPARATIN OF COPPER SULPHATE

1337 B.L.T., Ambala Cantt. -Wishes to know the processes of manufacturing copper sulphate, etc.

Copper sulphate is also obtained by directly dissolving the metal in concentrated sulphurie acid; for this purpose copper and sulphuric acid are heated together. The metal is oxidised by a portion of the oxygen of the acid, while sulphurous acid escapes. The crude copper obtained by smelting the ore, and containing about 60 per cent, of metal is treated with sulphurie acid. The resulting solution is evaporated in leaden vessels and the clear liquid is left to crystallise in copper pans. From the mother liquor of the crystals, metallic copper is precipitated by means of iron, because the presence of a large quantity of iron sulphate cenders this mother liquor unfit for vitriol. This method of obtaining copper sulphate is the least expensive but the salt is not quite pure.

If the copper scraps, turnings, borings, etc. are previously converted into copper oxide it exposure to a red heat, only half the grants; of sulphuric acid needed when the metal and the acid are heated directly, is required. On a large scale it is manufactured as follow.

Sheets or scraps of copper are heated to redness in a reverberatory furnace to the law ing point of sulphur. A quantity of sulphur is thrown in. The furnace door and clied openings are closed tightly, the effect bein (1.) formation of copper sulphide. After some time air is admitted into the furnace whereby the sulphide is converted by a comparatively less heat and the action of the oxygen into sultonic The mass is next placed in a suitable vess. I and as much sulphuric acid is added to it as as sufficient to saturate the oxide of copper. The clear solution, having been decanted from the insoluble residue is set aside for crystallisation.

SODIUM CITRATE

Sodium citrate is a crystallisable substance much used in medicine. It is usually prepared

by neutralising a saturated solution of sodium bicarbonate with a saturated solution of citric acid. The sodium of the bicarbonate unites with the citric acid to form the sodium citrate, and the carbon dioxide gas escapes, producing effervescence.

The resulting solution is directed to be evaporated to dryness. The mass is again dissolved in the least quantity of water and set uside to crystallise.

MAGNESIUM SULPHATE

Magnesium sulphate may be obtained from delotate or magnesium limestone. For this purpass the mineral, broken into fragments, is heated with a sufficient quantity of dilute sui phune and to convert its carbonates into sulphotos, the sulphate of magnesium is washed out of the mass with hot water and the solution, after defection, is evaporated and crystallised.

SODIUM ACETATE

Sodium wetate may be prepared by neutralretire codium contounts with acetic acid. The solution thus obtained is evaporated and set eade to crystalfise.

EYE DROPS

1.316 N.J.V. Murtarapur--Wishes to have and fortable of eye drops.

175 grains. aborder aced

The alphale 20 fl. oz. creatised water to make

Describe the solids in the sterilised water and then steem through a small plug of cotton and the first partion of the lotion may contarn bullment and is therefore allowed to be terms of again,

STORAGE BATTERY PLATES

1124 KRD, Mundra Clesires to know a is a seed making storage batters plates.

A storage battery in its implest form conts of two load plates. The positive plate is could with red lead, while the negative is overed with lithurge. To cout the positive pate, or pare a stiff paste of red lead with dilute sulphuric acid. Ordinary commercial sulphuric The contract of the confidence of the contract of the contract

HARIKUME'S

Hosiery Needles

(Made in Japan)

AGENTS & STOCKISTS:

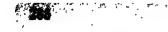
DAWN & CO., 11, PORTUGUESE CHURCH ST.,

CALCUTTA - 1.

Grams:

Phone:

B. B. 514 & 5755. Olddawn.



ild may be used for the purpose but it might diluted with water; about 2 parts of water 1 part of acid seems to be a good proportion r the acid commonly used. Concentrated dd may be used with the addition of water, it in this case the plates will take a very long me to dry and harden, which is objectionable.) coat the negative plate, similarly prepare paste of litharge with the sulphuric acid soluon as prepared above. In pasting the plates, y them flat on a wooden board and rub the stes on the surface of the respective plate ith a spatula. After this set aside the plates ith edge upward in a warm place to dry and urden. From 12 to 24 hours, according to se, are necessary for drying the plates proughly.

DTOR CAR WAX POLISH

Carnauba wax	120	parts
Kerosene oil	50	**
Stearic acid	15	**
Oleic acid	3	**
Benzaldehyde	6	**
Triethanolamine	8	
Water to make	825	97

Melt the carnauba wax, stearic acid and sic acid. Remove from fire and add the kerone oil and benz-aldehyde. Stir thoroughly, we add a hot solution (80°-85°C.) consisting 240 parts of water and the triethanolamine, ir well until a smooth emulsion is formed, an add sufficient hot water to make 825 parts. ntinue stirring until nearly cold; then bottle.

MAM.

1396 H.H.J., Vankaner -Wishes to have process of making kimam.

The principle underlying the manufacture kimam is almost the same as in the case of ti. The only difference to be kept in view that while surti is to be marketed in solid dition, kimam is put on the market in the most a thick liquid of various consistency.

Usually the water that is rejected after ating tobacco leaves in boiling water is made of in the composition of the kimam. The acco wash to be of any value to the manuturers must be strong enough to impart to infinal product its characteristic taste and rour.

The leaves most suited for the preparation kimam are Hingli and Madras. But Ranger leaves also yield a very good quality of nam. Usually 1 seer of leaf gives 1½ seers of nam.

STANDARD CHEMICAL & PHARMACEUTICAL WORKS

Manufacturers of:
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OF STANDARDIZED STRENGTH

4 PURITY 1. Jahar Lail Dutt Lana Galentta Various kinds of spices such as cardamom major, cardamom minor, saffron, aniseed, coriander seed, etc., may be incorporated with the tobacco wash as flavouring agents may be used but in a particular preparation all these should not be jumbled up. Judicious selection of the ingredients alone can give a balanced product. The quantity of the spices to be added is a factor dependent upon the taste and requirement of the people for whom the article is meant. Addition of musk to the extent of 1 to 2 drs. for every seer of kimam also improves the flavour.

The spices are allowed to ferment in the tobacco wash. The proportion of the tobacco wash and the spices should be so adjusted that the product after the completion of the fermentation operation attains a syrupy consistency. Finally add natural oftens such as ottos of hena, patchouli, etc. just before packing.

METHYLENE BLUE

1416 K.L.M., Nagpar Desires to know formulas of preparing methylene blue, cosine, etc.

Diractlylaniling	24	grams.
Hydrochloric acid, conc.	65	
Sodium nitrite	7.1	
Zine dust	20	13
Sodium toiosulphate	50	graios.
Potassium bichromate	25	"
Sulphuric acid, conc	53	11
Sodium chromate, neutral	8	n

Dissolve 12 grams of dimethylaniline in a mixture of 40 c. c. of water and 65 grams of concentrated hydrochloric acid, and cool the solution with ice to 12°-15°C. Stir the mixture and slowly run in the sodiam nitrite, taking care that the temperature does not rise above 15 C. The compound thus formed is next reduced by carefully adding the zinc dust, and the reduction is complete when the solution is of a clear red colour. The amount of zinc dust added must be sufficient to neutralise the hydrochloric acid, so that the blue litmus paper is no longer turned red. The solution is now diluted with water to 500 c.c. and a solution of 12 grams of dimethylaniline in the exact quantity of hydrochloric acid necessary to form the hydrochloride added, and then a solution of 50 grams of sodium thiosulphate in a little water.

Then oxidise the mixture by adding a concentraced solution of 25 grams of potassium bichromate and boiling for 2 hours.

Now pour the sulphuric acid being diluted with 100 c.c. of water and boil so as to expel sulphur dioxide formed in the reaction.

Next oxidise the leuco-methylene blue by adding the neutral sodium chromate dissolved in a little water and precipitate the resulting dye by the addition of salt.

Again, filter the base, dissolve it in a little boiling water to which a little hydrochloric acid has been added and again precipitate by com-

-READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write a his difficulties. As the department is in charge of an experienced businessman who is pecially adept in dealing with such problems and to whom experiences of a large number f successful businessmen are available, his replies will lead the enquirer to a successful areer. These replies will be published in the paper only and cannot be communicated by ost.]

VRITING FOR THE PRESS

349 P.L.D., Burdwan-Wishes to be engitened on how to write for the Press.

It is a matter of extreme difficulty to lay own rules for successful writing for the ress, since the qualities that make a man a relecome contributor to political paper will robably debar him from the columns of financial and economical paper. But all newsapers and periodicals have one thing in ommon. Their space is arbitrarily restricted and therefore the writer who fills a page with that can be adequately said in a sentence can ot hope for popularity with editors.

There is an obvious difference between the eccessary qualifications of the man who reports nd of the man who comments. The reporter just have very alert eyes. He must be able to see more than the average man, and if he has its acute sight, the measure of his understanding is a matter of comparative unimportance. Ite must, too, have detachment. Prejudice and inthusiasm both affect observation.

Outstanding success in writing for the ress, almost equally with other writing deemds on personality.

But while there is, on every newspaper taff, a small number of "star" writers who are mployed because of their own individual ualities, most of the columns are filled by men with the capacity for concise description, written with a certain sense of style, who may be relied in for accuracy and a propriety, which I amound to add is esteemed far more highly in one offices than it is in others.

The commentator the writer of leading rticles and of literacy, dramatic and artistic riticism—must also possess the same capacity or concise expression, with a sense of style and a knowledge which must be wide, but need not be very deep. The newspaper writer must carn how to use books of reference, and show where to find his facts and where to put also hand on the apt quotation. And I certainly ecommend the aspirant to collect anthologies. They save a world of time.

METHODS OF EXPORTING GOODS

1342 P.C., Bombay -- Requests us to describe the methods of exporting goods.

. When an order is received for sending souds to a foreign country it is ordinarily Vol. XLII, No. 498.

known as an indent and it contains particulars about the order and the terms and conditions for its execution. Amongst others it usually contains the following particular detailed description of the goods required, the rate of price, shipping and packing instruction, rate of valuation for insurance purposes, the date of shipment and the terms of commission, etc. Thereafter the exporter places order with manufacturers, wholesale dealers or producers, etc. whom he considers able to supply one or more items of goods mentioned in the indent, or ask for quotation from them. Then he sends inti-mation to the foreign merchant confirming the order given in the indent. The instruction for packing, forwarding will be given to the suppliers. These contain directions regarding the marks and numbers to be put on the cases. and the name of the port, dock or station where they are to be sent mentioning the ship by which they are to be shipped, and their ultimate destination. In packing and marking particular care should be taken according to the nature of the contents. When the goods are loaded invoices are prepared giving the name of the vessel and the marks and numbers of the cases together with the charges for cases. cartage, freight, primage, bill of lading, dock charg's and insurance charges. When the goods are placed on board the ship, the bills of Leting in triplicate are prepared and signed by the master of the ship. They are also to be annual. Thereafter they are handed over to the hipper of the goods. Each of them contains the a town of the ship and the shipper, the place of loading and destination, the description of . conds together with their weight and fieldht charges, the name of the person to whom the goods are to be delivered. When the goods are actually loaded, the shipper Lets a toate's receipt for the goods thus loaded. The bull, of loading are received by him from the officer in exchange for the cate's receipt.

One invoice, one of the Lilis of lading together with the insurance policy covering the goods, if any, are sent by post to the consignee so that they may reach him before the arrival of goods. It is also customary to send duplicate copies of the same by the next mail again, to the consignee so that if the invoice, bills of lading, etc. sont previously be miscarried the consignee may be put to any difficulty. The triplicate copy of these documents are kept by the shipper with himself.

The consignee on receipt of all these documents compares the details contained in them with the details of the order placed by him in order to see that the order has been strictly complied with.

-BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our superts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters

1138 C.R.R., Bangalore City—Processes of manufacturing brake fluid, neo cellulose thinter and clarifying castor oil appears in this asue.

1135 S.N.W., Sattur—Process of electroplating stainless steel will appear in due course.

1137 P.B.L., Mathura — Needle making nachines may be had of Baird Machinery Co., 3ridgeport, Connecticut, U.S.A. Wire may be 12d of Balmer Lawrie & Co. Ltd., 103, Netaji jubhas Road, Calcutta.

1138 K.P.S., Jabalpur — Bengal Satifood nay be had of Amulya Dhone Paul & Co., 113, Chengrapatty Street, Calcutta. Shrimany's alm sugar candy may be had of Sugar Candy factory. 4. Vivekananda Road. Calcutta.

factory, 4, Vivekananda Road, Calcutta.

1139 C.D.S., New Delhi—You may stock nedicines at your home and supply to dealers who want. Afterwards when you will get a uitable room on moderate rent you may start, shop. You should select only those common nedicines that are always in good demand. In this way you may expand your businesss from small beginning.

1140 A.S., Ajmer—For goggles and optical loods enquire of Eastern Optical Co., 306, Bowazar Street, James Murray & Co. Ltd., 5, Old lourt House Street and New Indian Optical Co., 57-3, Bow Bazar Street, all of Calcutta. Founsin pens may be had of F. N. Gooptu & Co., 2, Beliaghata Road; G. C. Law & Co., Cornwallis Street and Bharati Works. 22, lanel South Road; all of Calcutta. Fountain en nibs and other materials may be had of the bove firms.

1141 M.A., Madras—Reply to your query ppears under No. 1086 above.

1142 B.R.S.S., Ludhiana—For transfer thels enquire of R. G. Paul & Co., 110/2, Grey treet, Calcutta and Signograph Co., 208, Gopal al Thakur Rd., Baranagore, Calcutta.

1143 N.H., Siwan—For semai machine enuire of Oriental Machineries Supplying Agency 4d., P12, Mission Row Extension, Calcutta.

1144 P.M.S., Bareilly — Formula of tooth saste appears elsewhere in this issue. Collap-

sible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta Tube filling machine may be had of Interna tional Trading Co., 13, Netaji Subhas Road, Cal

1146 O.R., Rohtak Mandi—Plastic machine may be had of Small Machineries Mfg. Co., 22 R. G. Kar Road; Francis Klein & Co. Ltd., 1 Royal Exchange Place and Alfred Herbert (India) Ltd., 13/3, Strand Road; all of Calcutta Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta,

1147 H.B.M.C., Gulberga—Process of recharging storage batteries will appear in duccourse.

1152 R.C., Kanpur—You perhaps mean vacuum packing machine which may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta,

1153 A.T.P., Delhi—You should use Darjeeling or Dooar's tea for producing good flavour to ever ready tea.

1154 B.N.D., Calcutta—Addresses of chalk pencil manufacturer and tailor's chalk manufacturers quoted by you are complete; you may communicate with them direct.

1157 K.D.K., Dhandhuka—You may send article on fruit canning and preserving and if approved by our Editorial Board will be published in Industry.

1163 K.S.M., Cuttack—We are not award of any University or College where practical training is given on plastic industry.

1164 J.W.K., Batala—For pin, nib and needle making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1165 B.D., Longal — Transfer pictures may be had of R. G. Paul & Co., 110/2, Grey Street and Signograph Co., Baranagore; both of Calcutta. Fret work is done by means of free working machine which may be had of Orlent's Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. You may consult Indigenous Drugs of India by R. N. Chopra.

A HELPFUL GUIDE!

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By DURGA PERSHAD, B.A.

▲ complete Guide to the manufacture of stone slate with details of Stone quarrying and splitting, Grating, Bevelling, Edging, Polishing, Framing, Organising etc.

A chapter has been added on the manufacturing of steel slate.

INDUSTRY PUBLISHERS LTD., 22, R. G. Kar Road, Calcutta - 4.

S.I.B., Jhans:—Formulae of snow and vanishing cream appeared in April, 1950 issue of Industry.

1173 K.B.R., Visianagram—For bakelite cape enquire of the following firms:—India Moulding Co., C-2, Bharat Bhawan, 13, Chittaranjan Avenue; National Moulding Co. Ltd., 26, Upper Chitpur Road and Radha Bazar Bottle Stores, 15, Radha Bazar Lane; all of Calcutta. Tin printing is undertaken by Bengal Tin Box Mnfg. Co. Ltd., 1, Jadu Mitra Lane, Calcutta; National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street, Calcutta and Metal Box Co. of India Ltd., B2, Hide Road, Kidderpore, Calcutta. Labels may be had of Sikri & Co., 55, Canning Street, Calcutta. Collapsible tubes may be had of Metal Box of India Ltd., B2, Hide Road, Kidderpore, Calcutta. You may use denatured spirit in ink.

1174 S.S., Nagpur—For match splints and veneers you may enquire of the following firms: Amrit Match Factory, Kargi Road, Bilaspur; Madras Match Works Ltd., 42, Gollawar Agraharam Road, Tondiarpet, Madras and Anakapalit Match Co., Anakapalit, Vizagapatam.

1176 V.M.L., Cranganore—We have no book on film industry. For cinema machines enquire of Britania Talking Machine Co., 194, Dharamtalla Street, Calcutta; Eastern Electric & Engineering Co., 127, Mahatma Gandhi Road, Dombay 1 and International Talkie Equipment Co., 17, Queen's Road, Bombay.

1178 S.K.B., Kaliashahar Oxalic acid and gallic acid may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. Aniline blue, naphthol black, etc. may be had of Fuziehussein & Bros., 44. Armenian Street and Champalal Agarwalla, 45, Armenian Street; both of Calcutta.

1179 K.D.B.C., Mandsaur—Following is a list of cement factories: Robtas Industries Ltd., Dalmianagar. Debrion Sone Dt., Shababad; Sonevalley Portland Cement Co., Ltd., Japla: Sahabad Cement Factory. Hyderabad; Katni Cement Industrial Co. Ltd., Katni: Paflala Cement Co. Ltd., Suralpur; Pahala State and Lakheri Cement Works Ltd., Lakheri, Saurastra Complete list of cement factories will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage. In order to remove rancidity of old ghee boil the ghee with lemon leaves and raw turmeric.

1181 K.R.S., Rayadrug—For gunny enquire of the following firms:—Bholaram Motilal, 72. Cotton Street: Das Brothers, 29, Strand Road and Pioneer Bag Co., 15, Netaji Subhas Road: all of Calcutta. Carpets may be had of C. M. Hadow & Co., Srinagar. Kashmir; Kailash Carpet Factory, Srinagar. Kashmir: Indian Carpet Corporation, 30, Chittaranjan Avenue, Calcutta

and Carpet Stores. 7 & 11. Lindsay Street, Calcutta. You may have the plant locally.

1182 B.C., Ahmednagar—For radio receivers of required brand enquire of K. C. Dey & Sons, 161-1, Harrison Road: Phillips Electrical Co. (India) Lid., 2, Heysbarn Road and General Radio & Appliances Ltd., 10, Old Court House Street; all of Calcutta.

1184 S.C., Habarane-For tools required enquire of Subol Dutt & Sons Ltd., 13, Brabourne Road, Calcutta; and Vickers Eastern Ltd., 19, British Indian Street, Calcutta.

1186 M.C., Tinsukia Betanic name of chaulmoogra is hydrocarpus inebrians and in ayurved system it is known as chaulmoogra, Formulas of ink will be found in April 1950 issue of Industry.

1159 G.M.B., Gadag Following is a list of gless factories in Calcutta: Artistic Glass Works, ?, Tagore Castle Street; Asiatic Glass Product, 20B, Sahitya Patishad Street; Burma Glass Works, 9, Ezra Street; Itind Glass Works Ltd., 35, Chiffaranjan Avenue and Krishra Silicate & Glass Works Ltd., 17, Radha Bazar Street. Full fist of glass factories will be found in Industry Year Book and Directory published from this office, price Rs. 16/1/ including postage. Following is a list of policry manufacers. Bengal Potterles 14d 45, Tangra Road; Calcutta Potteries 14d. 8, Lyons Range: Hindusthan Potteries, 12, Shib Kristo Daw Lane, Orient Potteries Ltd., P16, Mission Row Extension and Reliance Firebrick & Pottery Co. Ltd., 8, Clive Row, all of Calculta.

1190 S.K.R.K.R.S., Moradabad You may use extra hard paraffin way I lb, and I lb, tallow in the formula of lustre polish.

1193 HRS., Narsapur - Process of manufacturing all sorts of ink will be found in Manufacture of Ink published from this office, 12 cc R3, 3/9/- including nostage.

1197 A.G.Y., Vaniyambadi For tanning chemicals write to Calcutta Chemical Co. Edd., to Bonfield Lane, Calcutta: Allied Accuey, 16, Bonfield Lane, Calcutta and Banshidhar Dutt, 126, Khengrapatty Street, Calcutta

1139 VN, Deihi Acid colouring bath mans a solution of acid colour to be used in decing. Sometimes some sails are required to make the colour fast.

1203 M.A.S., Labore We have no book on dour milling industry. Let letter enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanado East, Calcutta and Standard Literature Co. Ltd., 13/3, Old Court House Street, Calcutta.

1203 K.R., Salem In. We cannot publish notice of ballot hox invented by you without seeing its usefulness.

MANUFACTURE OF RUBBER GOODS

A treatise exposing in a simple style the manipulation of raw rubber in the manufacture of various rubber goods and giving detailed processes of their Manufacture.

Pully Illustrated. Price Rs. 3/-. Postage Extra.

INDUSTRY PUBLISHERS LTD., 22, R. G. Kar Road, Calcutta - 4.

1205 T.R.V.K.S., Mysore—To produce gloss to soap use 5 p. c. castor oil.

1206 R.K.D., Vengurla-Process of refining and deodorising coconut oil, groundnut oil and castor oil will appear in due course.

1207 S.D.C., Truchiarapalli—For celluloid cleets enquire of A. K. Zainuddin & Co., 122, Bhindi Bazar, Mohamad Manzil, Bombay 3; Kundanmal Ramial, Sewri Bldg., 78-80 New Hanuman Lane, Bombay 2 and Swadeshi Industries Ltd., 100, Netaji Subhas Road, Calcutta. 1208 P.S.B., Mysore—You should u

vacuum packing machine, for making sweetmeat tins airtight. Vacuum packing machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1209 R.S.C., Agra-Process of chromium plating will be found in Electroplating in Practice published from this office, price Rs. 3/9/including postage.

1210 C.R.R., Bangalore City - Process of manufacturing artificial leather cloth will

appear in due course.

1211 S.C., Habarana—Detailed process of manufacturing casein moulding powder follows after the general process. You should try the detailed process as given.

1212 H.B.H., Simla-Mixing and kneading machines may be had of Prabartak Commercial Corporation Ltd., 61, Bowbazar Street, Calcutta and Kilburn & Co. Ltd., 4. Fairlie Place, Calcutta.

D.O., Gwalior-For British Pharma-1213 copia enquire of Das Gupta & Co., 54-3, College Street, Calcutta.

1216 V.G.S., Cochin—For books on palmistry write to D. B. Taraporevala Sons & Co. Ltd.. Taj Bldg., 210, Hornby Road, Bombay; D. A. Nadkarni & Co. Ltd., 22. Tank Road, Bombay 26; Gurudas Chatterjee & Sons, 203-1-1, Cornwallis Street, Calcutta and Dey Brother, B47, Sir Stuart Hogg Market, Calcutta.

1218 D., Kanpur-For books on embrotdery designs write to Gurudas Chatterjee & Sons, 203-1-1, Cornwallis St., Calcutta; Wachel Molla & Sons, 6, Dharamtala Street, Calcutta and L. Mullick, Wool House, 183, Dharamtala Street, Calcutta.

1219 S.M.Y., Trichniopoly-Following is a list of newspapers: Ettalast; Iran; Armaghan; Omid and Setareh issued from Teheran, Persia.

1225 A.N.M., Banaras-You may start mail order business with small capital. You may also go through Reader's Business Problems **Bection**

1227 P.V.G., Alleppey-Following is a list of used stamp dealers: Ghosal & Co., 85, Tantipara Lane, Santragachi, Howrah; Stamp Mart 13, Dharamtala Street, Calcutta and Stamp Centre, 10, Chowringhee, Calcutta.

1228 S.B., Moradabad-Formulas of lustre peerless etc. appear elsewhere in this issue.

1229 B.M.S.S.W., Bombay - For required hydrometer enquire of Adair Dutt & Co. Ltd. Stephen House, 4 & 5, Dalhousie Squar, Calcutta

1231 J.N.C., Bogra—It is not possible to deodorise methylated spirit. You may us carnauba wax to shoe polish. As regards tars alta you may use give or gum arabic to make alta bright and glossy.

1232 J.B., Gadag-For plastic signboard and nameplates enquire of Geni & Co., 325, 326

China Bazar, Madras.

1233 E.B., Erode-Chemicals may be had of Parry & Co. Ltd., Chemical Dept., Dare House Post Box No. 12, Madras; P. R. Pillai & Co 36, Venkatachala Mudaly Street, P. T., Madra and Premier Indian Scientific Co. Ltd., 1-33 Varadarajalu Naidu Road, Egmore, Madras.

1234 R.K.S., Sibsagar—For tobacco cutting machines enquire of Oriental Machinery Sup plying Agency Ltd., P12, Mission Row Exten sion, Calcutta.

1235 R.K.S., Juliundur City-Process v manufacturing etching powder, dragon's bloom appears elsewhere in this issue.

1236 A.P.C.S., Calcutta-Process of silver ing glass appeared in April, 1950 issue o Industry.

1237 S.R.M., Kumbakonam -Please writ

in English.

1238 A.P.J., Rohiak-Safety pin and hei pin making machines may be had of Baire Machinery Co., Bridgeport, Connecticut, U.S.A

1247 P. R. K., Banaras City - Weaving accessories may be had of Apollo Engineering Co., 84, Apollo Street, Fort, Bombay; H. M Mehta & Co., Apollo Street, Fort, Bombay and Hindusthan Loom Co. Ltd., 5, Bank Street Fort, Bombay.

1249 P.P., Banaras—Address of Sen & Co

is 37. Moti Sil Street, Calcutta 13.

1251 D.I.U.C., Ujjain -- Addresses othe than those already published in Industry Yea Book and Directory are not available.

1254 T.R.S.L., Madras -- For ruby red glass enquire of United Provinces Glass Works Ltd

Bijnor, Moradabad, U.P.

1256 H.G.A., Orai - Distilling apparatu may be had of Adair Dutt & Co. Ltd., Stepher House, 4 & 5, Dalhousie Square East, Calcutts Ointment pots of plastic may be had of Nute (India) Ltd., Deokaran Mansion, Princess St Bombay and Plasto Metal Moulding Co. of India

Technology and Manufacture of Printing Inks.

A Treatise Treating in Full with the Principles and Manufacture of Various Sorts of

Typographic Inks, News Ink, Jobbing Ink, Book Inks, Coloured Inks,

Lithographic Inks, Intaglio Inks, Etc. Etc.

Price Rs. 3/- Postage Extra-

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Bembay 1.

1258 P.N.C., Anakapalle-We have no book on mantle manufacture. An article on mantle manufacture appeared in December, 1949, issue of Industry.

1262 G.R.B., Kurdwadi-Following is a formula of imitation gold: Copper 90 parts; gold 21 parts; aluminium 71 parts. Melt the copper and the gold in a crucible composed of refactory materials or of a mixture of unburnt fire clay and dust of firebricks, glass pots or seggars and when the metals are fluid the aluminium is added. When not more than 2 lbs. of the alloy are made at a time the mass is kept in a fuse state for half an hour about 12 oz. of borax being added as a flux. melted mass is then poured into ingots.

1264 K.C.W., Agra-Plastic machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta.

1265 H.S., Howrah Process of manufacturing pencil will be found in Industry Prize Articles Vol. 1 published from this office, price Rs. 2/- including postage.

1269 S.N.W., Sattur-You may use nifric

acid for etching iron.

1270 N.K.S.W.M.U., Srinagar-Crown cork may be had of Crown Cork Manufacturing Co., Uma Kanto Sen Lane: Ghughudanga, Calcutta.

1274 G.V., Surat -- You may take agency of goods manufactured by Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktola Main Road; Bengal Immunity Co. Ltd., 153. Dharamtala Street and Calculla Chemical Co. Ltd., Panditiya Road; all of Calcutta.

1275 C.A.G., Dehra Dun For plants of mange enquire of Clobe Nursery, College St., Market, Calcutta; National Nursery, 46, Ramdhone Mitra Lane, Calcutta; Kumaum Nursery, Ramnagar, Nainital and Dass Nursery & Flower Garden, Rai Bahadur Road, Behala, Calcutta

1277 P.J.P.R.C., Vellore For washing oil dissolve I part salt in 100 parts water and use this.: Quantity should be half the quantity of oil to be washed. Then make a solution con taining 1 part sodium bicarbonate in 100 parts water and use this solution for washing of. For diesel oil engines enquire of the following firms: Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; Bombay Co. Ltd., Pollock Hou e. Pollock Street: Heatly & Gresham Ltd., 6. Mission Row Extension; Marshall Sons & Co. Ltd., 99, Netaji Subhas Road and National P :gineering Co., 379, Netaji Subhas Roal; all of Calcutta.

M.A.N., Nagpur-Process of manu-

facturing white paint will appear in due course. 1279 C.J.D., Tuticorin-Dip the yarn in a strong solution of alum and carefully dry it. For preserving fishing net for 40 parts of net 3 parts of cutch; 1 part of blue vitriol; 1 part of potassium chromate and 21 parts of wood tar are required. The kutch is boiled with 150 parts of water until dissolved and then the blue vitrlot added. Next the net is entered and the tar added. The whole should be stirred well and the net must ball i to 8 minutes. Now take out the netting lay it in another vessel, cover up well and leave also for 12 hours. After that is dried well , pread out in a clean place and coated with linscod oil. Not before 6 hours have elasped should it be folded together and put into the water.

1281 K. L. G., Kargi Road - For selling beedies in Burma, Java, etc. advertise in news-

papers of those countries,

1284 P.G., Dhakurja Formula of ordinary taral alta given at last of all formidas of farat alta wil be good and at the same time cheap,

1287 M.L. Colombo We have no book on export trade of Ceylon. You may consult Ceylon Trade Journal issued by the Department

of Commerce, Colombo, Ceylon.

1288 H.C.N., Puculia For power booms enquire of W. H. Brady & Co. Lid., Mercantile Bldg., Lall Bazar, Calentta: M. L. Chatterjee & Sons, 4, Commercial Bidga, and Britannia Engineering Co. Ltd., 28, Dalhousie Square; all of Calcutta. For details you may negotatiate with the firms direct.

1289 P.I.J., Teschar - Confectionery machines may be had of Small Machineries Mfg.

Co., 22, R. G. Kar Road, Calcutta,

1291 JKB, Bombay Following is a list of match in aufacturers. Islam Match Factory, Alanedabad: Kankuria Match, Factory, New Kankaria Tank, Ahmedabad; New Cambay Match Factory, Cambay, Kaira, Western India Match Co. Ltd., Alambazar, Near Calentta; Pioneer Match Factory, 18, Dum Dum Road, 21 Pargs, and Hydart Match Co., 150A, Belliaclerta Main Road, Calcutta. Fire works may he had of Orient Pire Works Co. 175 B. Upper Circular Road, Calcutta; Jai tlind Fire Works. Karim Chambers, Hamam Street, Fort, Bombay.

1293 M.A.A.S., Virginia -Particulars of saw

anst are not known

1294 L.L., Chaibasa -The treatment of wills which are to be conted in flat colours is to prime with a thin east of lead and oil well has bely into the wall. Need golf on a chin conf of glue size; next a coat mixed with a oil and furpentine, next a coat of flat paint adxed with impositive. If you are any dry pigment not

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at oil and thin with turpentine. If, in see the paint dries too fast, and is to show laps, put a little glycerine in. retard the drying.

1235 Y.L., Shivpuri-We have no book on the for laundry machine enquire of laundry machine enquire of thap & Co. Ltd., 93, Netaji Subhas Road, Calitta and Phoenix Machinery Agency, Gordhan ursery 4th Lane, Khetwadi, Bombay.

1296 F.C., Bombay — Saffron may be had Bhan Brothers Ltd., Srinagar; Fairways, Q. Box No. 51, Srinagar, and Kashmir Honey ores, Udhampore; all of Kashmir,

1297 R.K.C., Lashkar-Process of making

iemical barometer will appear in due course.

1298 H.K.M.R., Holur—We have no book paper manufacture. For a book on paper anufacture enquire of Thacker Spink & Co. .933) Ltd., 3, Esplanade East, Calcutta.

1800 J.R., Transvaal-For jeweller's tools squire of Hamilton & Co. Ltd., 8, Old Court ouse Street, Calcutta and Jom & Co., 10, Old purt House Street, Calcutta. Please write sarly what particular formula you want hen we shall supply the formula.

1301 K.S.N., Moyar Camp-For electrode aking machine enquire of Balmer Lawrie & 1. Ltd., 103, Netaji Subhas Road and Francis lein & Co. Ltd., 1, Royal Exchange Place; both Calcutta

1303 G.S., Amritsar-To make artificial eth grind feispar and quartz to an impalpable wder together with a certain amount of kaolin. ien make the mixture into a thick paste with ater and tint in a variety of colours by means titanium dioxide or by the use of salts of balt, uranium, manganese, etc. Next press e paste in moulds in which are inserted planum pins. Then burn the teeth in saggers

itil well vitrified a temperature of about 48°C. ing required. They are then covered with enamel made of the same materials as the dy of the tooth, but mixed in slightly differ-

t proportions.

1309 G.C.T.C., Allahabad—All the ingrediits may be had of Banshidhar Dutt, 126, sengrapatty Street, Calcutta. Process of mirr making will be found in Small Industries iblished from this office, price Re. 1/8/- includg postage. For hair clip making machine quire of Oriental Machinery Supplying ency Ltd.. P12. Mission Row Extension. Jeutta and Baird Machinery Co., Bridgeport, nnecticut, U.S.A.

1311 H.S.O.M., Ambala City-Soap making uipments may be had of Small Machineries ig. Co., 22, R. G. Kar Road, Calcutta. Soap iterials may be had of Calcutta Mineral Supply

 Ltd., 31, Jackson Lane, Calcutta.
 1312 G.R.S.I., Bhiwani—Addresses of Glass mufacturers Association and Rubber Manusturers Association are not known.

1316 N.J.V., Murtazapur-You may start unufacture of penholders and foot rules, etc. th Rs. 5,000/- to Rs. 10,000/-. You may start mufacture of fountain pen ink with Rs. 5007a very small scale. A recipe of scorpion bite re will appear in due course.

had of Small Machineries Mfg. Co., 23, 2. 3 Kar Road, Calcutta.

1820 S., Lucknow-Leather colouring and polishing process will appear in due course.

1324 K.R.D., Mundra-Process of storage battery manufacture and motor body polish appears elsewhere in this issue-

1325 S.R., Babathsingala—If you distill

the toddy you may preserve it in bottles.

1326 Q.M.A., Hinganghat—Glass eyes for preserved dead animals may be had of P. Basak & Co., 9, Chidam Modi Lane, Calcutta.

1329 U.S.J., Jodhpur-For bleaching oil you have to use animal charcoal which should be 5 to 10 per cent. according to the quality of the oil. Sajji is used for bleaching oil.

1330 M. P. G., Dhampur - For taking agency of kerosene oil and other oils you may negotiate with the following firms: Adamji Lookmanji & Co., 35, Bapu Khote Street, Null Bazar, Bombay; Dadar Kerosene Depot, Palija Mansion, Vincent Road, Bombay and Harbox Gopiram, 26, Burtolla Street, Calcutta.

1334 P.K., Kumabakonam — Formula of distemper appeared in March, 1951, issue of Industry.

1335 K.M.T.F, Mahim - For tile making machines enquire of Martin Burn Ltd., 12, Mission Row, Calcutta, and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta. Process of manufacturing improved appears elsewhere in this issue.

1336 S.K.G., Raigarh-You may negotiate with the following firms for taking agency: Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktala Main Road; Calcutta Chemical Co. Ltd., 35, Panditia Road and Bengal Immunity Co. Ltd., 153, Dharamtala Street, all of Calcutta.

1337 B.L.T., Ambala Cantt.-Formulas of copper sulphate, magnesium sulphate, etc

appears elsewhere in this issue.

1338 S., Lucknow--For cycle seat leather you should use stiff leather of the type of saddle leather.

1341 U.C., Jamnagar -- In manufacturing ayurvedic preparations you should always use genuine herbs and drugs and in no case substitutes should be used. Raw materials will be available from dealers in indigenous herbs and drugs. You should always use attractive labels and packing should be done very carefully and artistically. As regards publicity you may advertise in newspapers and periodicals and also distribute handbills and placards in the towns where you have agents or representa-You may appoint agents in big towns tives. of India, Viz: at Delhi, Calcutta, Madras and Bombay. These agents should be given power to appoint sub-agents who will work in cooperation with the agents.

Agra - Envelope making 1342 R.G.S., machine may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. As regards paper you may buy from market.

1343 G.C.T.S., Allahabad - There is no arrangemene for giving practical training on

1145 V.K.B., Singanallur—Citrle acid B. P. same citric acid manufactured by British harmacopea Process and Standardised.

1348 S.B., Delhi—For gunny bags enquire the following firms: Bholaram Matilal Cotton Street; Calchtta Hessian Exchange, 3-2, Netaji Subhas Road; Das Brothers, 29. trand Road, and Fool Chand Sarawsie, Clive ow; all of Calcutta.

1349 M.N.H., Mysore—Formulas you want ill be found in Small Industries published om this office, price Re. 1/8/- including ostage.

1353 N.S., Kanpur — We have no book on ater proofing canvas and rolling mill industry rocess will appear in due course.

nachines enquire of the following firms: luest Keen Williams Ltd., Construction House, iallard Estate, Bombay; Heatly Gresham Ltd., Forbes Street, Fort, Bombay; M. H. Dinshaw & Co., 105-106, Apollo Street, Bombay, Mather & Platt Ltd., Bruce Street, Fort, Bombay; Alfred Herbert (India) Ltd., 13/3, itrand Road, Calcutta; Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta; Warshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta; Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta and Martin Burn Ltd., 12, Mission Row, Calcutta.

1357 D.R.K., Jullundur City — Industry is the only journal of its kind in India. There is no other journal like Industry.

1358 R.I.W., Akim Swedru Present whereabout of Lahore University is not available.

1359 T.T.W.C., Allahabad — You may consult Manufacture of Toilet Goods published from this office, price Rs. 4/9/- including postage. For books on radio enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

1360 S.T., Raipur - Process of mirror making will be found in April, 1950, issue of

Industry.
1361 J.C., Kanpur-We are not aware of any hypnotist or mesmerist who will teach you hypnotism and mesmerism practically.

1362 S.P.C., Singapore—You should communicate direct with the querist care of industry when your letter will be duly

redirected.

1363 H.L.B., Agra—Following is a list of bristle merchants: Jai Bharat Brush Co., 278, Soparibaug Road, Parel, Bombay; Indian Bristles & Lard Supply Co., 314, Tangra Road, Calcutta; S. Mazumdar, 67B, Netaji Subha; Road, Calcutta and Volkart Bros., Armenian St., Madras. Process of bleaching bristle will appear in due course.

1364 I.A., Colombo—Bottles may be had of Bimal Bottle Stores, 130, Radha Bazar Street. Radha Bazar Bottle Stores, 15. Radha Bazar Lane and S. P. Singha & Co., 4, Ezra Street: all of Calcutta. Labels may be had of N De & Co., 1, Bhim Ghose Bye Lane, Calcutta and Bharat Laxmi Press, 92, Princess Street, Calcutta.

machines may be had of Small Machineries Mig. Co., 22, R. G. Kar Road. Calcuita.

1369 S.L.B., Calcutta — Manufacture of wood screw on small scale will not be very profitable. Machines may be had of Alfred Herbert (India) Lid, 13,3, Strand Road, and Francis Klein & Co. Lid., 1, Royal Exchange Place; both of Calcutta. As regards raw materials you have to secure from second hand dealers.

1370 A.A.N., Vellore Process of utilising used storage battery plates will appear in due course.

1380 M.W L. Aijal -Shoe making tools may be had of A. C. Mohamad, A. C. House, P16, Bentmek Street, Calcutta. Plywood may be had of Hindusthan Corperation, 29, Strand Rd., Calcutta and Khaitan Sons & Co. Ld., 2, Dalbousie Square East, Calcutta, Rickshaws may be had of Benjai Cycle Rickshaw Works, 13, Sm t Uast Road and H. D. Nundy & Co., 50 6. Dharaostafa, Street 5 both of Calcutta, Carpenter's tools may be had of Bengal Hardware Store, 165, Chardney Chowk; Calcutta Hardware Store, 137, 138, Chandney Chowk, Calcutta and Imperial Ha dware & Co. 186, Chandney Chowk, Calcutta. Enamel may be had of Sur Enamel & Stamping Works Ltd., 9, Middle Road, Entally, Calcutta and Calcutta Tiu Can & Enamel Works, 72, Tiljula Road, Calculta.

1383 R.K.T., Bhagw offnacar -Refer your query to Homocopathy State Faculty, West Boucal, 1B, Old Post Office Street, Calcutta.

1356 MA., Madras We do not understand what you mean by ball point ink. If possible phase supply sample of the ink when we shall try to supply you the formula.

1389 LM, Bhawanmandi Tin plate is manufactured by Tinplate Co. of India Ltd., Junes Ledging, Bohar. Following is a list of paper memberturers: Bengal Paper Mills Co. Ltd., 21 Noticel Sublins Road, India Paper Pulp Co. 133 S. Clive Row, and Fitagleir Paper Wills, Co., 6 red Bank Bldg., all of Calcutta. Matches a communifactured by Brahmaputra Match Works Ltd., 49, Burtollo Street; Esavi India Match Mill. Co., 150A. Belliaghata Main Road and Western India Match Co. Ltd., Alambagar, all of Calcutta.

1995; KMS. Arth Coult For salammontae bars and tabits enquire of Bengal Counteal & Phartaneous of Works Ltd., 161, Manifeltata Main Road of Calcutta Chemical Co. Ltd., 35, Panditia Road, Phillygongo, both of Calcutta.

1395 D.C.B., Ahmedabath - We have no book on envelope manufacture. Envelope making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1396 H.H.J. Varkaner Process of manufacturing scented betchnit chips will appear in due course.

1397 Y.V., Nettore For chemical plants enquire of Chemical Plants & Fquipment Ltd., 7, Lower Chitpur Road, Calcutta. For Japanese machines enquire of Oriental Machinery Submachines enquire of Oriental Machinery Submachines Agency Ltd., P12, Mission Row Extension, Calcutta.

-REVIEW OF BOOKS

HOW TO CHART TIME STUDY DATA by thi Carrel- Published by Mc Graw-Hill Book tompany, Inc. New York. Pages 322, price \$ 5-0-

10000

The value of collecting and marshalling me study data as handy tools towards achieving reduction of costs of production, improvements in techniques of production, etc. has been mg understood in the industrial countries of ne world. It has been found that investments a time study incentive in manufacturing do ay in the long run and can help improving mployee satisfaction, production costs, delicates and profits, which make the essential ements of success in competition.

To derive the best benefit from these data is usual to make charts and tables. The book nder review makes a systematic approach to the fundamentals and methods of charting time udy data and attempts to explain the methods is setting them up in various forms for the nick and correct solution of various problems of usiness that arise during the daily course of anaections.

The book urges the compilation and applicaon of standard data method in making time udy, as the recorded standards are said to ive many advantages over those obtained by rect time. Moreover these are said to be ipersonal, more correct and ageless. The book so studies how the time study methods can improved and the forms of standard data n be constructed to secure speed and accuracy. x commonly used forms of working data, e.g., drawing, time equations, alignment arts, monograph, multi-variable charts, curvemily-have been fully discussed in the book ith numerous graphs and worked out examplesstailed methods of their construction and plotting points have also been provided step step in the book. How these can be used analyse element data and to determine retionships between variables of time and mensional factors has been thoroughly dealt th in the book. The reading of these curves d converting them into tables also require re and in this respect also the book will make most helpful guide.

Each of the above six forms of data prentation has both advantages and disadvantees inherent in it but the author's personal eference however happens to be the multiriable form expressed in numbers. But at a same time the author indicates that one thod in charting cannot be the best. Relative its are too important to be disregarded, nee choice of the form that most nearly fits specific conditions at the time of application if be necessary.

The book covers a wide range in time study a and will be immensely helpful to all those o desire to make any use of time study data the general improvement of their processes business. In India this subject should

ROLE OF PRIVATE ENTERPRISE IN INDIA—IN RETROSPECT AND PROSPECT, Published by the Secretary, Employers' Association, 15, Park Street, Calcutta 16. Price Re. 1.

The pamphlet under review traces out the changes that have occurred in the industrial structure of India during the last few years. It shows that in 20 years India has changed from a wholly agricultural economy to an agricultural cum industrial economy. The pamphlet discusses the subject under the following heads: Growth of joint stock principle from 1900 onwards, development and progress of industrial joint stock companies since 1930, volume of capital employed in Indian industries, availability of capital development of credit institutions, installed capacity and production in various industries like textiles, steel, paper, sugar, cement, tea, etc., foreign capital in India, etc., etc. It will be seen from the survey that Indian enterprise is now broadening its base in several directions. The booklet makes interesting reading and the facts revealed by it should be taken into account in making any scheme for the industrial uplift of the country.

NOTICES & REVIEWS

(Manufacturers sending specimens and numples of their products for notice and review may please note that no notice is published of medical preparations and nilled substances in this section.)

vermilion

We have the pleasure to receive a packet of "Satiprova Sindur" manufactured by Indian Vermilion Manufacturing Co., 16/1, Nandalal Bose Lane, Calcutta 3. The preparation is found to be of superior quality.

FOUNTAIN PEN INK

We have received from Hindusthan Small Industries, 39, Maniektola Main Road, Calcutta, one phial of "Royal Blue" fountain pen ink, which is found to be good.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry.)

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